PACKAGE engineering

Do your lines need closer control?

Here's a new route to better control: using a single chart (rather than two separate ones) to control two interrelated packaging line variables—complete with all the equations you need to develop your chart. (See Page 47)

Developing packages to reach the moon

This provocative review of what we now know about performance requirements for packages that must withstand the hazards of outer space challenges us to prepare to solve "tomorrow's problems" that are already here. (See Page 70)

How to choose machinery and equipment

Showing that the selection process is more than a casual inquiry, but is neither confusing nor mysterious—demanding, rather, a systematic study and forecast of production packaging and operating needs. (See Page 84)

Complete table of contents on Page 2

OCTOBER 1960

VOLUME 5 • NUMBER 10

Chances are 9 out of 10 he'll pick up a Scandia-wrapped "Pocket Pack".

All but two brands of cigar "pocket packs" in this picture are wrapped on Scandia machines.

What does this mean to you? It means that if you have an over-wrapping problem of any kind, Scandia know-how can help you.

Many cigar manufacturers started with us through our Machine Rental Program. This is the practical way to *prove the value of new packages* at low machine cost.

Later as sales of "pocket packs" went up and production loads increased we supplied our cigar accounts with high-speed, fully automatic over-wrapping machines. Like all Scandia-built equipment, these machines are dependable and foolproof.

No matter what your over-wrapping problem is, no matter how complicated, Scandia ingenuity and craftsmanship can lead the way. Call or write today.

Scandia Packing Machinery Company, 500 Belleville Turnpike, North Arlington, New Jersey. Telephone: Wyman 1-8400.

SCANDIA
MEANS CRAFTSMANSHIP

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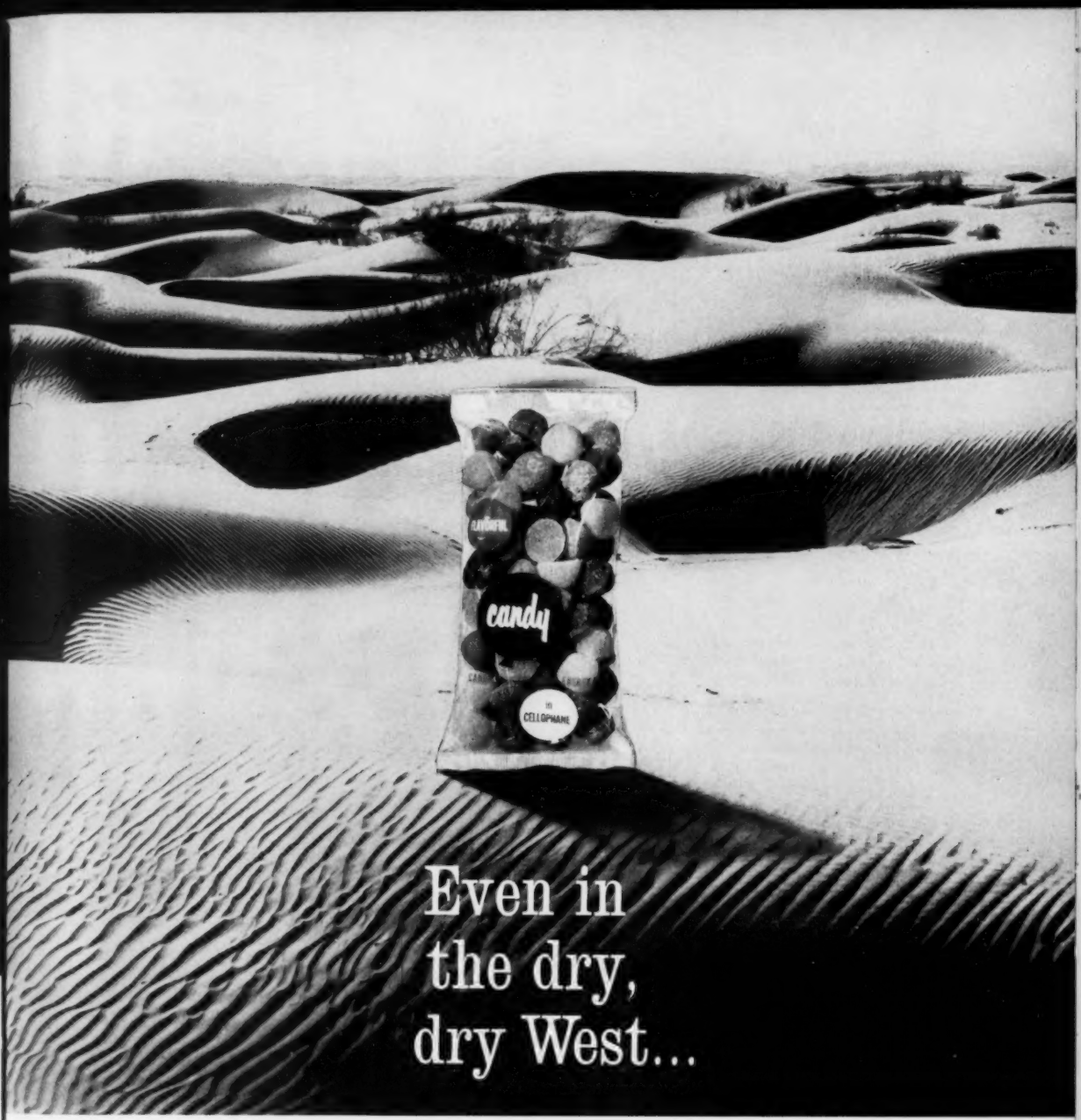

Even in the dry, dry West...

Du Pont "K"* cellophane keeps candy fresh longer

Take the case of the candy manufacturer who distributes his products in 16 western states. Talk about dry—out there the average humidity is 12% to 17%. You can imagine what *could* happen to his candy.

He tested all sorts of packaging materials. But only one was moisture-proof enough to keep his candy from drying out—and also tough enough to take the knocks of shipping and handling. It was Du Pont's new polymer-coated "K" cellophane, Type 600.

But that's not the whole Du Pont cellophane protection story. "K" cellophane, Type 600, is just one of over 100 Du Pont cellophanes with different coatings for special packaging jobs. They're all tops for efficiency on high-speed packaging lines . . . and all give crystal-clear transparency that moves products *fast!*

Need help with a packaging problem? Call a Du Pont Representative. He'll be glad to help you. And ask him for the new booklet, "Properties and Uses of Du Pont Cellophane". It's a handy reference guide that can be useful to you. Or write: Du Pont Film Dept., PE-10, Wilmington, Delaware.

*Du Pont trademark

DU PONT
Better Things for Better Living . . . through Chemistry

DU PONT cellophane

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OCTOBER 1960 • VOLUME 5 • NUMBER 10

PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

For your calendar

October 6 or 13. Packaging Institute regional meeting on shipping containers:
Rodger Young Auditorium, Los Angeles, Calif. Contact: C. Paul Bolton, Carnation Research Laboratories, 8015 Van Nuys Blvd., Van Nuys, Calif. *Telephone: STate 5-6596.*

October 12-14. AMA orientation seminar on improving user-supplier teamwork:
Hotel Astor, New York, N.Y. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

October 24-25. Society of Packaging and Handling Engineers, Maryland Division, 6th Annual Eastern Industrial Packaging and Handling Show:
Fifth Regiment Armory, Baltimore, Md. Contact: W. A. Yockel, Davison Chemical Div., W. R. Grace & Co., Baltimore 26, Md. *Telephone: ELgin 5-4900.*

October 31-November 2. Packaging Institute 22nd Annual National Packaging Forum:
Statler-Hilton Hotel, New York, N.Y. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

October 31-November 4. AMA packaging management course:
Hotel Astor, New York, N.Y. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

1961: February 9-10. University of Wisconsin Engineering Institute on packaging industrial products:
Wisconsin Center Building, Madison, Wis. Contact: Richard A. McCormick, institute coordinator, department of engineering, University of Wisconsin, Madison, Wis. *Telephone: ALpine 5-3311, Ext. 2815.*

1961: November 7-10. Packaging Machinery Manufacturers Institute Show of 1961:
Cobo Hall, Detroit, Mich. Contact: W. L. Redding, Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22, Pa. *Telephone: ATlantic 1-8552.*

Articles

47 **Make one chart control two variables,** by Walter L. Heilman and Eugene U. Mariani, Cincinnati Toilet Goods Plant, The Procter & Gamble Company
Telling why one chart is better than two for simultaneous control; includes details and equations for developing and constructing the elliptical chart.

54 **Packaging techniques reduce on-line product damage,** by Larry N. Gordon, production superintendent, Cakemasters of America
Techniques one company worked out for packaging fruitcakes at a speed of up to 54 per minute, with less than 0.1 per cent cake breakage.

60 **Predict stacking strength of corrugated boxes accurately,** by A. H. McKinlay, packaging engineer, General Electric Company
Stresses the importance of specifying column-crush test values on purchase orders, so that corrugated board used in boxes will meet these values.

68 **Modified column-crush test for corrugated boxes**
Here is the procedure modified by Mr. McKinlay, which General Electric uses for specifying the grade of corrugated board to be used in fabricating its boxes.

70 **Packaging for lunar exploration,** by Kenneth Brown, technical staff, Space Technology Laboratories, Inc.
Reviewing problems facing the packaging engineer regarding what may happen to a package and its contents when landing on the moon.

84 **Can you choose the right equipment?** by Edward W. Love, director, machinery research and development, Bristol-Myers Products Division, Bristol-Myers Company
Factors you should consider when selecting equipment—type of operation, knowing your package and your product, what to look for, and where to find it.

96 **Select the right package for a sticky product,** by William G. Louden, director of product development, Paterson Parchment Paper Company
Some reasons why tacky products stick to some packaging materials more than others; includes discussion on characteristics of some familiar tacky products.

105 **Packaging Institute holds its 22nd Annual National Packaging Forum**
Program of this year's forum, "Packaging for the 60's," including dates and times of the technical meetings, and the speakers.

108 **Practical pointers to better folding carton performance:** Part VI—User-supplier relations
Last part in our current series, pointing out the need for good communications, mutual understanding, and sharing of information.

Package Engineering is indexed in Engineering Index

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Reader Service Cards inside back cover

Our December, 1960 issue will carry a cumulative editorial index for the year, listing our feature articles by subject, author, and other headings.

ARMOUR
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with revolutionary smokeless
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For a fast, clean, smokeless packaging operation, nothing measures up to the new CCA bacon cartoner. Its exclusive method of localized impregnation, without direct contact, prepares only those surfaces to be glued... before the bacon is packed. No direct heat is applied to the carton during or after product insertion. This spares your product contact with damaging high temperatures, eliminates unpleasant wax fumes, and retains the protective characteristics of the wax and the exterior package appearance. Quick conversion for carton size change. Double hoppers available for packing two grades of bacon. To pack it—move it—sell it is the business of CCA packaging.
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A note from the Publisher

Deceptive packaging is everyone's business

At one of the national political conventions this summer a speaker referred to the opposition platform as a "gilt-covered package," the implication being that a fancy package could mask a product that in performance might not live up to its outward appearance. This remark made me wonder if packaging, as an industry, could ever become a political "whipping boy."

Some 25 or 30 years ago, Wall Street was the popular segment of the economy to attack, and today Madison Avenue is blamed for certian aspects of American life. Phases of finance and advertising, like phases of packaging, have the power to deceive if *improperly* used, but are tremendously vital and important to our economy when *properly* used.

Certainly packaging should not become a political whipping boy, since few segments of our economy contribute as much to the nation and to each individual's well-being as packaging does. We are all quite aware of the obvious and valuable advantages—too numerous to mention—that packaging provides the housewife alone, the greatly reduced distribution costs, and, of course, the literally millions of jobs in every corner of the United States that this great industry creates.

It is in the area of *deception* that packaging could be attacked, however. For instance, the manufacturer who correctly states on the outside of a package the weight of the product contained, but through the use of interior packaging utilizes only a fraction of the interior volume of the package, is being deceptive. By doing this, he is undermining the packaging industry and undermining himself because such deception discourages repeat business.

In a survey made by the Food and Drug Administration of 106,095 packages in 35 different food groups, it was found that 15.2 percent of all lots sampled were below the stated net contents—presumably this was a representative cross-section. The percentage of short weight lots in given food groups varied from 1 in 88 for baby food, to 33 in 84 in corn meal. However, only 0.5 per cent of the lots surveyed were short by 5 per cent or more. The seriousness of these short weights depends to some extent on the type of product, whether or not there is the intention to deceive, plus other considerations which the government may so indicate.

A good package should give the best possible impression of the product it contains, regardless of whether it contains bulk chemicals or cosmetics, but it also should be realistic, both as to quantity and how the product can be used. Obviously the package should give viously the package should give should run well on packaging machinery if at all possible, not price the product out of the market—and it has to do all these things without deceiving the buyer in any way.

As Miss Ciaramella pointed out in her article in our September issue, the government takes a marked interest in deceptive packaging. It is in the interest of all of us in packaging that *no* packaging be deceptive, even though such deception be within the letter of the law. Integrity *must* be a first consideration at all times.

Angus J. Ray

Publisher

PACKAGE engineering®

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Publisher

R. Bruce Holmgren
Editor

Harry E. Vick, Jr.
Managing Editor

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Contributing Editor

Judy Van Dam
Assistant Editor

Anne Bernhard
Business Manager and Circulation Director

Stephanie H. Welden
Advertising Production Manager

Burton Cherry
Art Director

Executive and editorial offices:
185 North Wabash Avenue
Chicago 1, Illinois
Telephone: FInancial 6-1440

Advertising sales offices:
Irwin F. Megargee
National Bank Building
Ocean City, New Jersey
Telephone: EXport 9-3519

Arnold Gieseler
299 Madison Avenue
New York 17, New York
Telephone: YUkon 6-8575

Ronald F. Ingelhart
William H. Mathée, Jr.
185 North Wabash Avenue
Chicago 1, Illinois
Telephone: FInancial 6-1440

West Coast representatives:
The Robert W. Walker Company
730 South Western Avenue
Los Angeles 5, California
Telephone: DUnkirk 7-4388

57 Post Street
San Francisco 4, California
Telephone: SUtter 1-5568

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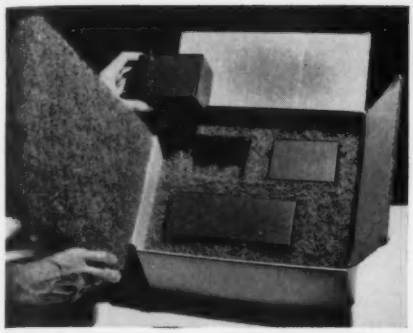

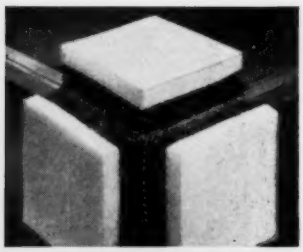

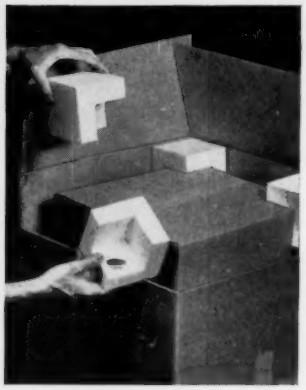

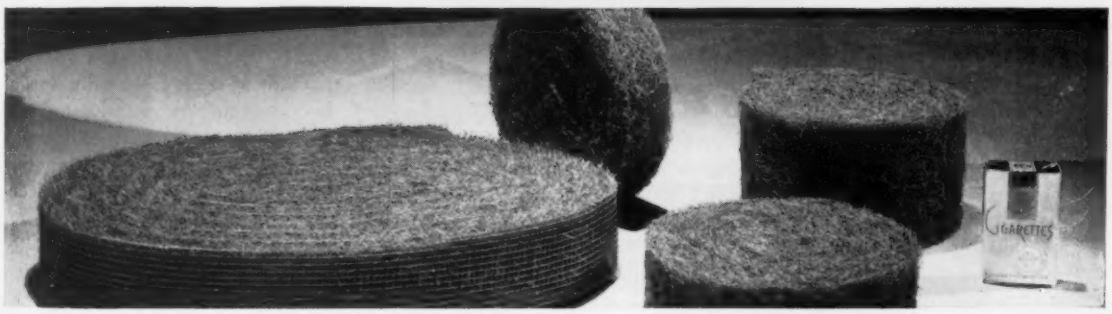

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and chances are we know a way that fits your problem best. Write for our data-packed booklet on package cushioning which explains how to select and design package cushioning to reduce damage from shock, vibration. Send request on your company letterhead. The B.F.Goodrich Company, 188 Derby Place, Shelton, Connecticut.

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The PULSE/of packaging

Packaging across the seas:

Anticipating progress in the standardization of packaging laboratory activities, a EUROPEAN PACKAGING FEDERATION subcommittee is meeting this month in Paris to make a definite start toward such standardization. Subcommittee members say that standardizing the details of instruments should facilitate sharing and comparing test data from country to country. Also they predict the holding of meetings between laboratory specialists from the various national packaging centers, as well as more lab-to-lab contact and the stepped-up sharing of test information.

However, differences in ways of classifying packaging materials and machinery continue to plague European packagers striving for more uniformity. We hear that countries having definite systems are reluctant to give them up, and European experts tell us that research on a unified system seems of most help to a national center not yet having its own system. Other European packagers say a growing awareness of the problem indicates rising interest in more standardization.

Packaging in Australia is up 90 per cent since 1950, according to a report just released by the New South Wales government office in New York. The report looks at paper and paperboard, metal, glass, plastics, textiles and wood. Free copies are available from the NSW government office, 680 Fifth Ave., New York 19, N.Y. . . . The first INTERNATIONAL CONGRESS ON THE TECHNOLOGY OF PLASTICS PROCESSING, taking place this month in Amsterdam, Holland, just before the macro-Plastic exhibition, is expected to bring together research scientists and practical plant operations people. Prof. Dr. A. J. Staverman, Leiden University, congress committee chairman, hopes this first meeting "on the international level" will develop better understanding between the two groups.

England is ahead of the U.S. in developing techniques to overwrap bread with polyethylene film, according to BAKELITE LTD., British affiliate of Union Carbide Corp. Citing increased interest in automatic overwrapping, it says new equipment will wrap loaves at 60/min. in contrast to the present 40 loaves/min. . . . All is not well with London's PACKAGING CENTRE which recently closed its doors after two years of service to packaging in its country. High costs prevented this professional activity from being a commercial success, but its sponsors hope to re-open it in some form in the near future. . . . CAMPCO DE MEXICO, S.A. has acquired the plastics fabricating division of CELANESE MEXICANA, S.A., Mexico City. Campco's parent corporation, Chicago Molded Products Corp., says Campco will continue to make the Celanese lines of polyethylene, acetate, butyrate, and styrene sheet and film.

Groups in the news:

Those attending PACKAGING INSTITUTE'S October 6 regional meeting at the Rodger Young Auditorium in Los Angeles will hear four technical papers on shipping containers, and also participate in round-table discussions, according to Allyn C. Beardsall, The Mead Corp., chairman of the regional meeting. He says speakers will cover corrugated and solid fibre containers, multiwall and baler bags, partitioning and cushioning, as well as interpretations of carrier rules.

THE SOCIETY OF THE PLASTICS INDUSTRYY, INC. is working with the commodity standards division of the U.S. Department of Commerce's office of technical services in getting industry reaction to its proposed commercial standard for polyethylene sheeting. It hopes to issue a revised standard which draws on comments and experience of producers and users.

Trends to watch:

Proponents of the new CONLAB STANDARDS GROUP say that some 40 laboratories are already participating and that there may be as many as 100 in the near future. Purpose of the group is to bring together laboratories here and abroad which are devoted to package and package materials manufacturing in order to get "optimum correlation and reproducibility of laboratory testing results of packages and materials," according to Container Laboratories Inc., Chicago, coordinator of the program. The group is setting up elaborate means to send each participating laboratory monthly sealed packages of uniform preconditioned materials for testing. A major object of the work is better correlation of testing and the improvement of measurement. . . . Reports indicate that the trend to automation in refrigerated warehousing is being retarded by package failures and the non-uniformity of individual packages. THE REFRIGERATION RESEARCH FOUNDATION, citing problems disclosed at its symposium early this year, now warns packagers that warehousing techniques dictate changes in package structural design and specification. It says that

birthplace of the really new ideas in pressure-sensitive labeling

To meet a definite need Avery originated pressure-sensitive labeling years ago—and since then has maintained its leadership with many notable new ideas.

Avery's persistent research in constantly seeking new frontiers for pressure-sensitive products has fortunately come up with a number of "firsts" . . . specific ways in which industry, commerce and individuals can benefit from lower costs, time saved and greater convenience.

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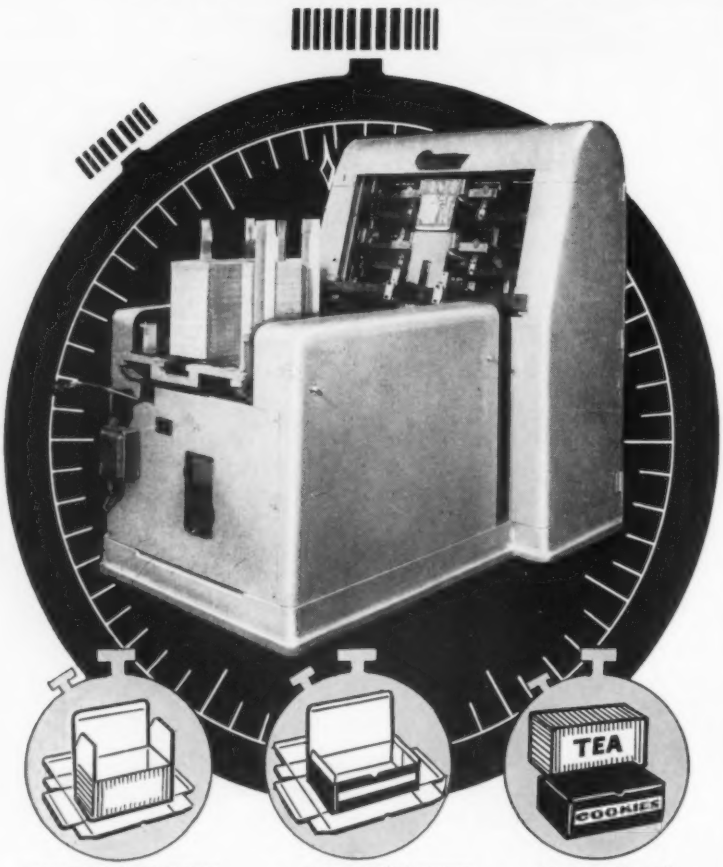

economical **glued** cartons and trays from low-cost uncoated blanks . . .

. . . or **heat-sealed** cartons and trays that are grease- and moisture-resistant from poly-coated blanks . . .

. . . for packaging all kinds of products

High speed . . . automatic . . . and perfectly-shaped trays and hinged, top-opening cartons! For packaging all types of bakery products . . . tomatoes and fruits . . . confections . . . cigarettes . . . drugs . . . and hardware specialties. Operates at *variable* speeds. Can be adjusted to produce a wide range of carton and tray sizes. **Peters Model SG** glues low cost uncoated blanks. **Model SG-P** heat-seals poly-coated blanks. Remember *glued* or *heat-sealed* cartons cost less for material, shipping and storage . . . and eliminate costly set-up labor.

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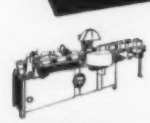
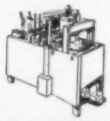

carton folding and closing machines

carton forming and lining machines


moderate-speed carton and tray forming machines

cellophane sheeting and stacking machines

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to withstand today's warehousing, containers must take extreme variability of temperature, humidity and vapor pressures during handling and transportation, and be strong enough to resist the stresses and strains on packages created by new warehousing procedures.

There is increased demand for polymer-resin-coated cellophane as compared to standard lacquer-coated cellophane types, according to AMERICAN VISCOSE CORP. . . . GLASS CONTAINER MANUFACTURERS INSTITUTE, INC. says that growing acceptance of nonreturnable bottles accounts for 65.1 per cent of all beer packed in the U.S. during the first half of 1960 going into glass. GCMI says this is the highest percentage for the first six months of any year since 1956. . . . Over half of the nation's packaging money is for paper materials, R. Carl Chandler, Standard Packaging Corp., told the NATIONAL FEDERATION OF FINANCIAL SOCIETIES' recent annual paper forum. Urging his paper-oriented audience to accept plastics as an ally rather than an enemy, he said plastics represent less than 6 per cent of the total packaging materials used today, and noted that in many cases (e.g., plastic-coated nested food containers and flexible pouches) plastics are developing more uses for paper in packaging.

More expansion for packaging: UNITED CONTAINER CO. has acquired BICKING PAPER MILLS. . . . A second complete aerosol line has been installed in REXALL DRUG AND CHEMICAL CO.'s St. Louis plant. . . . Near Akron, Ohio, ATKRON, INC. is constructing a 22,000-sq.-ft. plant and a 2,500-sq.-ft. general office. . . . U.S. INDUSTRIAL CHEMICALS CO. has doubled the production capacity of its Houston plant.

GLASS CRAFTERS' (owned jointly by W. Braun Co. and Carr-Lowery Glass Co.) new Chicago plant produces 1.5 million bottles a month. . . . H. S. CROCKER CO. has purchased STROBRIDGE

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HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

On this page...

6 new ways to make a good packaging set-up a better one

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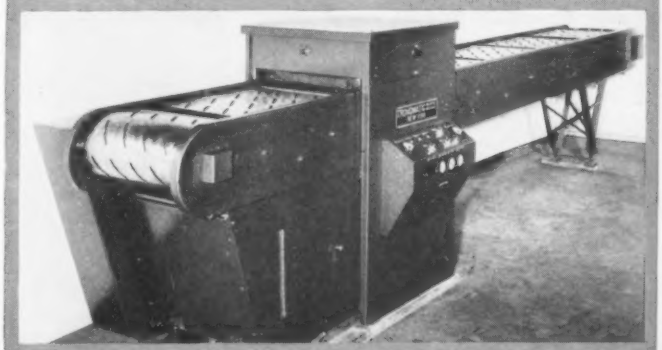
NEW ***BlisTPack HEAT SEALER*** seals through card, protecting product and plastic blister... lets you seal up to card and blister edges. A new process that cuts sealing time to as little as two seconds. Flat steel master tray minimizes chance of warpage or improper sealing, takes punishment that deforms web materials used in conventional sealers. Fast, simple changeover. Conveyorized automatic unit or efficient manual model.

NEW ***DIE CUTTER*** handles all thermoplastic materials... provides up to 20" of "daylight," more than 6" of stroke. Unique air-hydraulic power head rated at over 50 tons delivers pressure and speed desired, eliminates maintenance problems of pure hydraulic systems. Spring-loaded shuttle table permits outside loading. Mechanical in-press stop and heated platen increase die life and make special applications possible. Advanced safety and timing controls. Cutting areas: 24" x 36", 30" x 50", 40" x 60" and 49" x 73"

NEW ***FLANGE FORMER*** moves 80" to 400" per minute, makes 90° or 180° folds on any commonly used thermoplastic. Variable speed drive and positive dual thermostatic heat control assure smooth folding, whatever the speed. Edge being formed is heated, top or bottom, at all stages through forming die. Will fold parts up to 14" wide.



NEW ***PRESSURE FORMERS.*** Unique among pressure-forming machines, these Tronomatic models work with all thermoplastic materials. Production speed up to 20 cyc./min. in automated operations. Air-hydraulic power head delivers instant, high-speed force. No need for special plumbing, no "hydraulic" problems. 12" x 22", 24" x 30" and 20" x 24" models, with Tronomatic indexing and trimming equipment optional on the first two and "standard" on the third.

NEW ***VACUUM FORMERS*** combine with other Tronomatic machines in automated operations to let you do everything from forming to heat sealing to trimming to stacking finished parts. Standard models: 30" x 30", for skin packaging... single-station machines from 11" x 22" to 48" x 72"... advanced rotary units. Custom-tailored equipment also available.

NEW ***EXPANDABLE POLYSTYRENE MOLDER*** delivers up to 16" stroke, handles parts up to 40" high. Special mold mounting permits full use of "daylight," speeds loading, eliminates hazards of working "in the press." Connections to air, water and steam only ones needed. Five platen areas available, from 24" x 36" to 49" x 73". Can be fully automated, if desired.

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Planned Packaging moves merchandise

Shake it... squeeze it... but you can't poof it!

Sealed, tight, completely, from the time it leaves the filling line till it reaches the user's hands. Developed by Packaging Corporation of America technicians to eliminate use of inner bags or overwraps for cereals, dry powdered foods, soap products, chemicals and many others, this exclusive Calk-Seal* technique provides positive protection against sifting and infestation. And the single structure package multiplies filling line speed, reduces handling costs. Every day more and more packagers of such products are turning to the advantages of Calk-Seal as a superior packaging method. Developing and providing such advanced packaging techniques is but one of countless ways in which Packaging Corporation of America's concept of Planned Packaging, implemented through integrated national facilities, produces better packaging . . . more sales. Whether your requirements are large or small, regional or national, we welcome the opportunity to help you.

*Machine and process patents applied for.

Packaging Corporation of America

1632 CHICAGO AVENUE, EVANSTON, ILLINOIS

Cartons • Containers • Displays • Egg Packaging Products • Molded Pulp Products • Paperboards

LITHOGRAPHING CO. . . . GENERAL CORRUGATED MACHINERY CO., INC. is clearing ground for a new plant in Palisades Park, N.J.

H. B. FULLER CO. has moved to a new office building in St. Paul. Its former office will be converted to research and development. . . . A 25,000-sq.-ft. expansion by BATTLE CREEK PACKAGING MACHINES, INC. is scheduled for completion by November, 1960. . . . BALL BROTHERS CO. INC. is building a glass container manufacturing plant near Mundelein, Ill.

FIBREBOARD PAPER PRODUCTS CORP. has set up a new district sales office with headquarters in Boise. . . . A 55,000-sq.-ft. plant near Springfield, Mass., that will double its manufacturing, engineering and development space, is planned by CROMPTON & KNOWLES PACKAGING CORP.

A 150,000-sq.-ft. plant for the production of glass bottles and jars for OWENS-ILLINOIS GLASS CO. is underway in New Orleans, La. . . . As part of its $200,000-expansion, BIVANS CONVEYOR CO. has acquired three factory buildings adjacent to its present plant. . . . H & R PLASTICS INDUSTRIES, INC. plans to double its existing facilities.

How full should you fill flexible pouches?

Mary A. Ciaramella answers this question in her article, "It's easy to find fill per cent of flexible pouches," in last month's issue. Angus J. Ray, Publisher, in his "Note from the publisher" this month, refers to this article and reminds us, ". . . A good package should give the best possible impression of the product it contains . . ." You may have, free of charge, a single copy of this article for your laboratory, as long as our supply lasts. Write on your company letterhead to our Reader Service Department.

Dollars and cents:

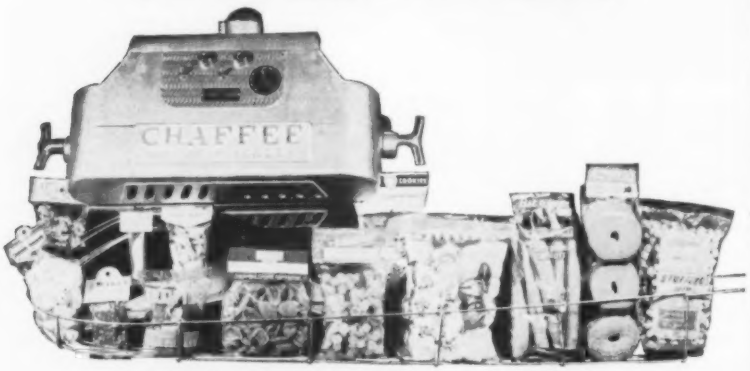
PITNEY-BOWES, INC. reports record sales and earnings for first half of 1960. Sales totaled $31,061,207, up 11 per cent over last year's $27,931,884 for the comparable period. For the same periods, income rose 7½ per cent, from $2,205,231 to $2,373,108. . . . NATIONAL CAN CORP. reports for the six months ending June 30, sales of $41,453,819 and a net loss of $654,278, compared with sales of $38,143,100 and a loss of $752,100 for the first six months of 1959. The company expects a high volume third quarter and says outlook for the entire year is "encouraging."

For the nine months ended June 30, BROCKWAY GLASS CO. had sales of $36,573,869 and income of $2,342,729. For the same period a year ago, totals were: sales, $36,324,053 and income, $2,317,181. . . . For the fiscal year ended May 31, THE DOW CHEMICAL CO. reports sales of $781,433,740, an increase of 11 per cent over the preceding year, and income of $82,404,342, a 31-per cent increase.

BEMIS BRO. BAG CO.'s sales for the first six months of 1960 were $66,357,068, a 4-per cent increase over the comparable period last year. Net income was $1,529,526, 16 per cent higher than a year ago. . . . An 8-per cent increase in sales for the first half of 1960 is reported by CELANESE CORP. OF AMERICA—from $127,578,050 in 1959's first half to $137,453,943. Net income, however, dropped 4 per cent from $10,445,088 in 1959's first half to 1960's $10,054,290.

For this year's first six months, THATCHER GLASS MANUFACTURING CO., INC. reports net sales of $25,530,984 and earnings of $1,136,618. For the same 1959

CHAFFEE ROTOR-SEALER



Production Line Heat Sealing The #1 Choice

WHY? Because it heat seals all popular sealable materials. You may change your package from sealing bag top labels on cellophane, polyethylene, pliofilm and saran to the sealing of unsupported films, viz; cellophane, polyethylene, pliofilm, vinyl, and all heat sealable films by simply turning the thermostat dial. Automatic Infeed, Code-Dater & Hole Punching device available.

Military Approved Sealer Available

RALPH CHAFFEE & CO.

2358-2360 MARKET ST. HEMLOCK 1-0807 SAN FRANCISCO 14, CALIF.

REPRESENTATIVES IN PRINCIPAL CITIES

PAPER ART CO., INC. GOES 100% TO POLYETHYLENE FILM, IMPROVES PACKAGES, AND CUTS PRODUCTION COSTS

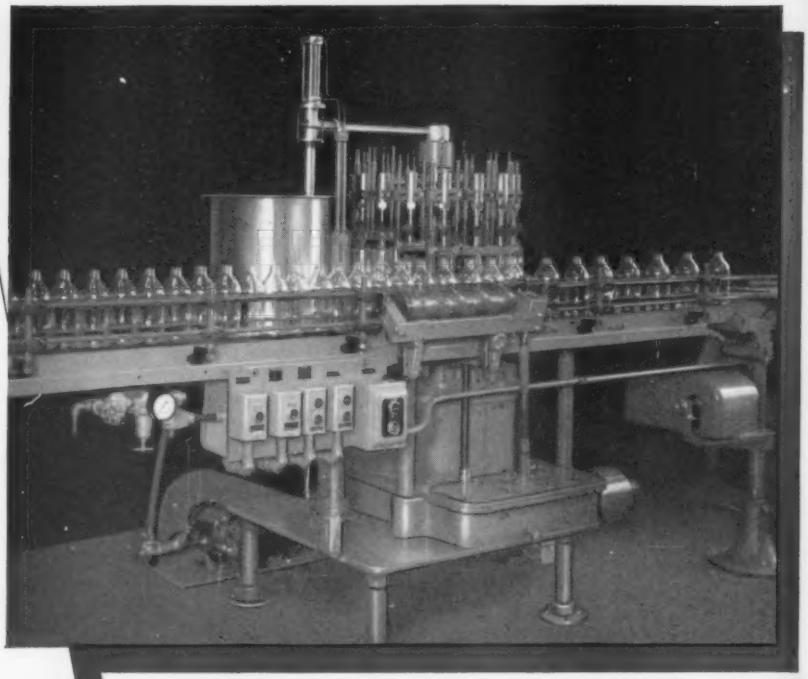
Paper Art Co., Inc. of Indianapolis, Indiana, has cut production costs substantially with a modernized production and packaging system using cast polyethylene film. According to the company, savings in packaging costs for the first quarter of 1960 averaged 47% as compared with the same period in 1959, while total production increased 5%.

The high-clarity, high-gloss film gives the company's packages a sparkling, attractive appearance . . . allows designs and colors of its plates, cups, napkins, table cloths and 400-odd other paper products to show through clearly. And polyethylene's excellent aging and strength characteristics have eliminated problems of embrittlement and tearing . . . improved shelf life of packaged products.

The film, which is cast from PETROTHENE® polyethylene supplied by U. S. Industrial Chemicals Co., makes possible a number of economies. With polyethylene, six "See-Safe" semi-automatic packaging machines, designed for handling this flexible film, can turn out 45,000 packages per 8-hour shift, replacing 11 packaging machines formerly used to do the same job. Both labor and materials costs are cut. Returns due to package breakage, too, are reduced, thanks to the tough long lasting polyethylene films.

By using polyethylene, you can enjoy the benefits of strong, low-cost, transparent packaging. Up-to-date packaging machinery lets you take full advantage of polyethylene's characteristics . . . turn out attractive packages of outstanding durability at high rates. For more information on cast polyethylene film made from PETROTHENE resin, or on packaging machinery such as shown above, write to the address below.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N. Y.
Branches in principal cities



MEMO

To: J. T. C.

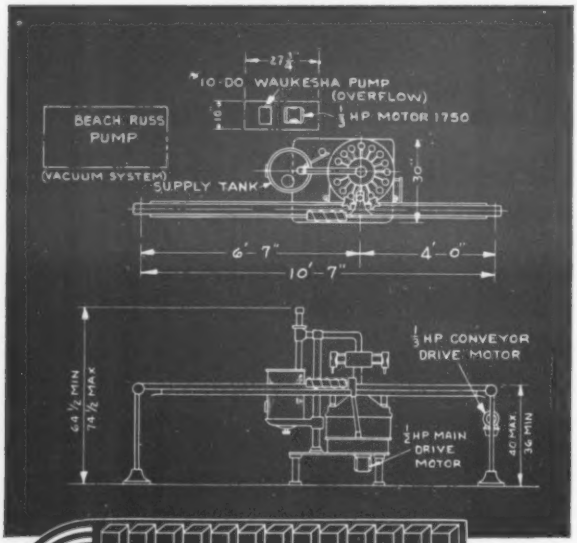
This looks great—let's get all the facts—

K. P.

PNEUMATIC "ALL-PURPOSE" FILLER

DOES ABOUT ALL YOU COULD ASK

in the line of liquid filling



Pick your filling method—vacuum, pressure or gravity principle. You can use any one, or any *combination*, with this machine. It handles liquids or semi-liquids of all types—open mouth or sprinkle top, containers of glass, metal or plastic. And its 16 heads do the job at speeds up to 180 per minute. Similar larger models are available for speeds ranging to 300 containers per minute.

Easy maintenance is another great feature of this machine. Besides quick interchangeability of parts and simplicity of adjustment, the open construction allows ready cleaning without disturbing mechanism.

Write for complete information.

PNEUMATIC SCALE CORPORATION, LTD., 77 Newport Avenue, Quincy 71, Mass. Sales Offices: *New York; Chicago; Dallas; Rochester.* Agents: *Fred Todt Company at Los Angeles, San Francisco, and Seattle. Rockwell Pneumatic Scale Ltd., Edgware Road, London, N. W. 2, England, O. R. M. A., Paris 8, France. Carbert Manufacturing Co. Division, Cambridge, Mass., Delamere & Williams Co., Ltd., Toronto.*

★ PNEUMATIC *Packaging and Bottling Equipment*

How a Plastic-pipe Maker Solved a Shipping Problem

With Low-Cost J-M Dutch Brand Strapping Tape

To save space when shipping, plastic pipe must be coiled into rolls of the smallest diameter possible. Such rolls have a tendency to spring-out and uncoil, especially during handling, but J-M Dutch Brand No. 400 Strapping Tape solved this troublesome problem simply . . . and with new dollar-savings!

Scores of glass strands in the vinyl backing of Dutch Brand No. 400 Strapping Tape give it exceptional tensile strength. And it's pressure-sensitive—adheres instantly, holds tenaciously. Thus, one quick wrap of No. 400 at four positions around the roll binds the coiled pipe securely. Rolls can be dropped on a warehouse floor, thrown into truck beds, compressed under weight, subjected to weather changes . . . endured during repeated punishment without releasing or uncoiling. Now binding time takes only seconds without the sharp-edged hazard to pipe products or personnel that often results in slower handling.

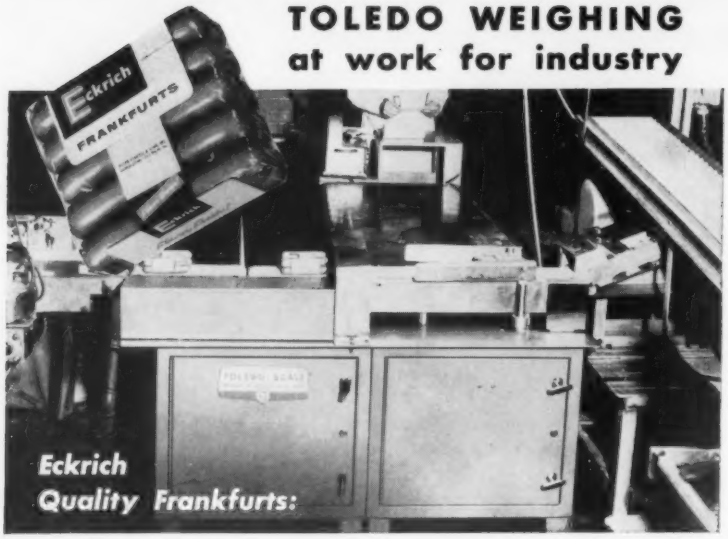
There are many ways to build an economical shipping program around Dutch Brand No. 400 Strapping Tape. Write for the J-M Dutch Brand Strapping Tape Booklet. It's filled with ideas, ideas that may help you solve one of your shipping problems.

JOHNS-MANVILLE DUTCH BRAND DIVISION
7800 South Woodlawn Avenue, Chicago 19, Illinois
In Canada—Johns-Manville Co., Ltd., Port Credit, Ontario

JOHNS MANVILLE JM PRODUCTS

JOHNS-MANVILLE

TOLEDO WEIGHING at work for industry



How TOLEDO Automatic Checkweighing assures accurate package weights, speeds production!

With the squeeze on meat packing profits, the drive for lower costs and better efficiency never ends. Peter Eckrich and Sons, Fort Wayne, Indiana, is a case in point.

ECKRICH has installed a Toledo 9457 Checkweigher (shown above) to automatically (1) weigh each 1 lb. package of frankfurts, (2) reject those over or under a tolerance zone within an accuracy of 1/32 oz., and (3) count the o.k.'s, overs and unders. This Toledo's accuracy and dependability enable Eckrich to report average production through the checkweigher at 55 packages per minute. And the o.k., over and under count guides the stuffing operation to assure most uniform control of frankfurt weights.

TOLEDO 2151 FLOOR SCALES in Eckrich's shipping room help fill salesmen's orders on a production basis. Each scale has an input station for imprinting the route number; a control station for taring of weight of the rack. Even though the items making up the order are loaded on the rack cumulatively, each item is automatically listed on the tape at its net weight.

In Eckrich's shipping room three Toledo 2151 Floor Scales are equipped to transmit weights to machines that list individual weights of items on tape as racks are loaded, giving both speed and accuracy in filling orders beyond any method previously used.

Toledo Scale engineers will assist you in developing more efficient, cost-saving weighing methods, based on the wide selection of Toledo industrial scales, or development of modifications or custom engineered units for your needs. Write and tell us about your problems. TOLEDO SCALE, Toledo 12, Ohio, Division of Toledo Scale Corporation. Toledo Scale Company of Canada, Ltd., Windsor, Ontario.

SERVICE Factory-Trained 240 Cities

TOLEDO® *headquarters for weighing systems*

• FLOOR AND TRACK SCALES • BENCH AND PORTABLE SCALES • OVER-UNDER SCALES • WEIGHT PRINTING • OVERHEAD TRACK SCALES • COUNTING SCALES • TRUCK SCALES

period, sales totaled $23,210,082 and earnings, $1,211,219. . . . OLIN MATHIESON CHEMICAL CORP. reports an increase in sales and earnings for the first six months of 1960—sales amounted to $348,281,000 compared with $347,296,000 in the first half of 1959. Earnings totaled $18,666,000, compared with $17,504,000 for the first half of 1959.

What people are doing:

Rexall Drug and Chemical Co.'s newly organized national film division will be manned by HORTON CONRAD, national general manager; JACK DE CAPRIO, national general sales manager; JOSEPH H. GAUSS, sales manager, national accounts; HENRY C. CLARK, manager of engineering and production costs control. . . . ROBERT MITCHELL has joined the development staff of General Food Corp.'s packaging laboratory.

GRAHAM T. STEWART has been promoted to assistant packaging coordinator of The Dow Chemical Co.'s packaging department. . . . THOMAS B. PORTER is now a sales representative for Armour Alliance Industries' adhesives division. . . . Milprint, Inc. has elected FRED M. STEFAN president and a director of the company.

Bemis Bro. Bag Co. has promoted DONALD E. PRIM to field sales supervisor for Michigan and Ohio. . . . Vice president in charge of sales for American Can Co.'s Bradley-Sun Div. is RICHARD H. McCARTHY, JR. . . . IRA E. CAVALLO is now Eastern sales manager for molded packaging division of Diamond National Corp. . . . The Black Products Co. has appointed two new sales managers —GEORGE H. GARRETT, Southern district, and HARRY N. BULLARD, Western district.

At Ludlow Corp., DR. A. W. FISHER, JR. has been appointed executive vice president and DR. H. H. REYNOLDS, vice president-research and development. . . . P. C. WHITING JR. will manage Midwestern sales for The Marvellum Co. *(End)*

For more information circle No. 214 on Reader Service Card

Circle No. 215 on Card ▶

New Slant on Purchasing Paper

Crossett Machine Time Plan lets each customer get his paper precisely as and when ordered, at a fair price, whatever the state of the paper market.

Each of Crossett's regular customers reserves specific amounts of *machine time* for definite periods each month. In effect, each customer "owns the mill" for the time required to produce his specific requirements.

Crossett Leatherneck Wrapping Paper. Consistent quality in all weights, fully weight-controlled for customer savings.

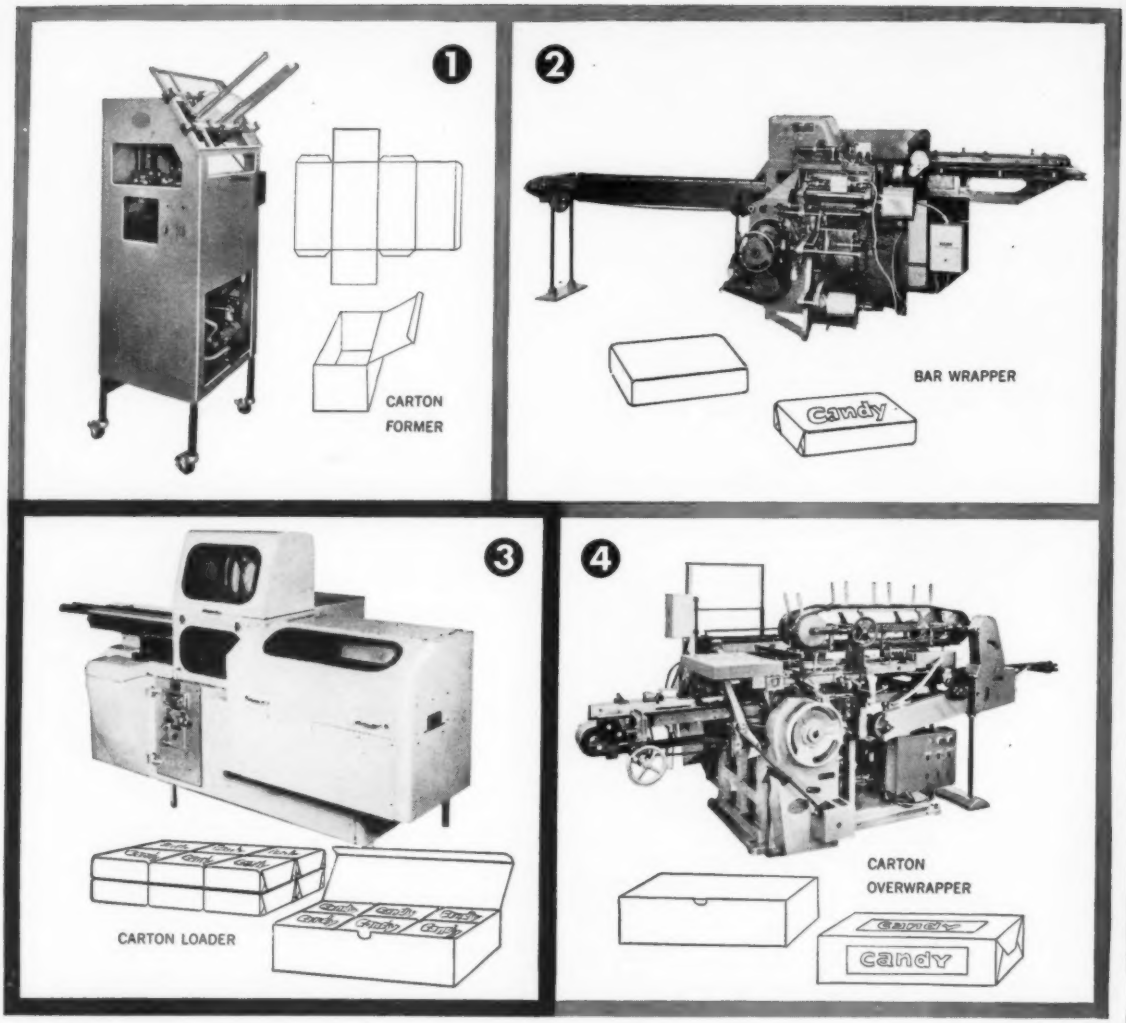
Crossett Leatherneck Converting Kraft. Custom-produced to the exact weight and quality needed. Basis weight control assures predictable yardage per ton. Crossett Technical Service available to customers.

Crossett Food Board. Cylinder machine production places long and short fibers precisely where needed for every packaging and printing requirement. Crossett Technical Service helps with customer problems.

Crossett
PAPER MILLS

A Division of The Crossett Company, Crossett, Arkansas, makers of paper, lumber, charcoal and chemicals. All from managed forests

For a new slant, hold page horizontally and sight along arrow.



FORGROVE 88 CARTON LOADER

Completes Integrated Packaging Line

The final step in completely automatic packaging is now available from Packaging Machinery. The Forgrove 88 Carton Loader readily ties in with many PACKAGE and Forgrove wrapping machines in addition to the ones shown. The 88 automatically loads candy bars, packs of cookies for vending machines, and other products in single or multirow formations. Will load at speeds up to 60 layers per minute into open topped trays or hinged-cover cartons. For full details on an integrated packaging line or for information on how to adapt the Forgrove 88 Carton Loader to your particular needs, call your nearest PACKAGE sales representative today.

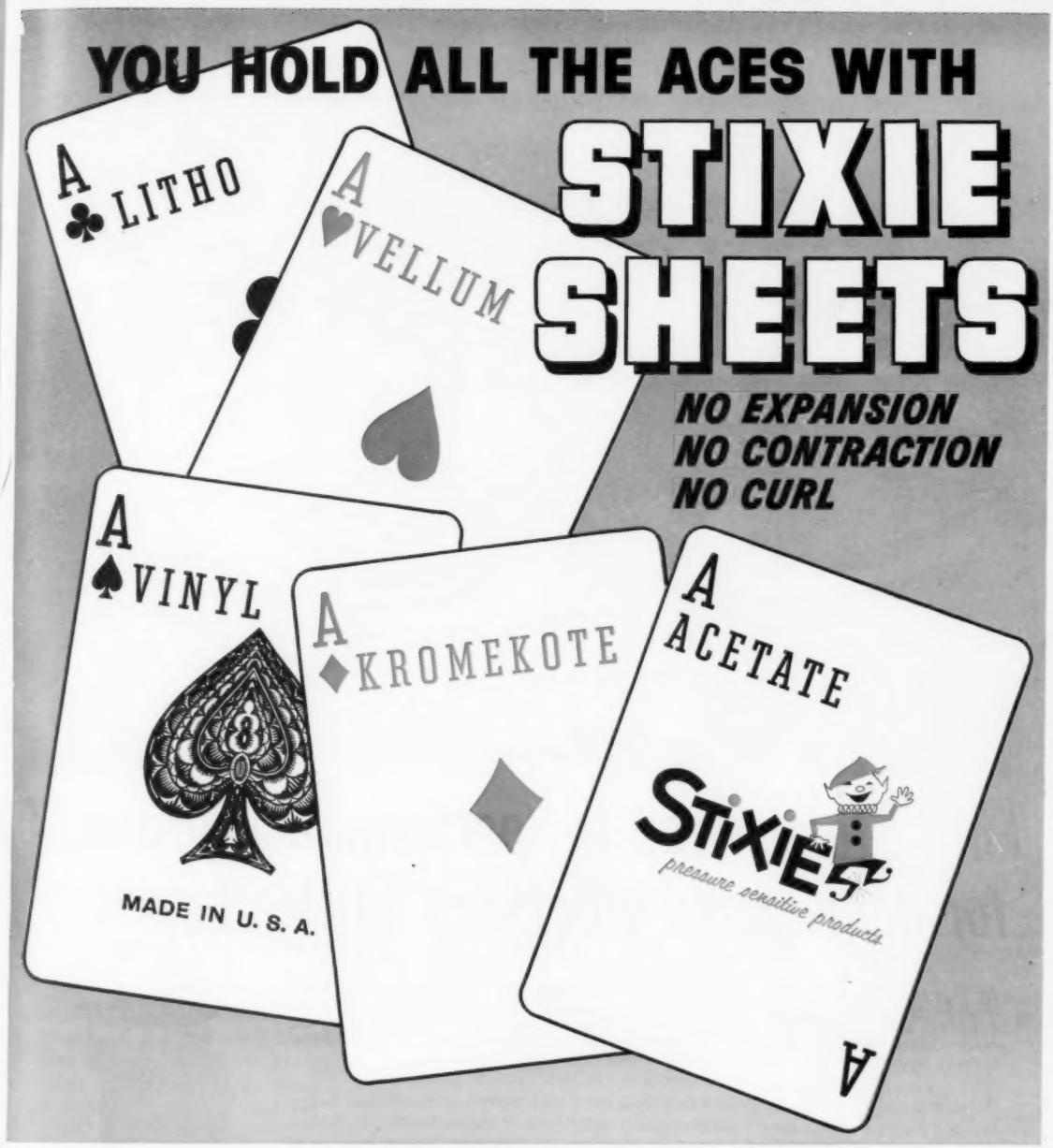
1. The Tray-Lock is one of 3 PACKAGE carton forming machines to use inexpensive, die-cut blanks.
2. The DF-1 candy bar or biscuit wrapping machine is one of many in the PACKAGE line for wrapping small products.
3. PACKAGE carton forming and wrapping machines tie in easily to the new Forgrove 88 Carton Loader.
4. The FA, most widely used overwrapping machine in the PACKAGE line, wraps with wax or kraft paper, cellophane, polyethylene or reinforced foils.

PACKAGING IS PART OF YOUR PROFIT PICTURE

PACKAGE MACHINERY COMPANY, EAST LONGMEADOW, MASS.

NEW YORK • PHILADELPHIA • ATLANTA • BOSTON • CLEVELAND • CHICAGO • KANSAS CITY
DALLAS • DENVER • LOS ANGELES • SAN FRANCISCO • SEATTLE • TORONTO • MEXICO CITY

PACKAGE



YOU NAME IT AND STIXIE'S GOT IT—TAG STOCK, CONVENTION BADGE STOCK, KROMEKOTE, LITHO, VELLUM, VINYL, ACETATE, ETC. PRINTABLE IN ANY WEATHER AND UNDER ANY CLIMATIC CONDITION, STIXIE'S CUSTOM AND STOCK SIZE SHEETS ARE AVAILABLE WITH EITHER PERMANENT OR REMOVABLE ADHESIVE (BOTH AT THE SAME PRICE) AND BOAST THE MOST RELIABLE RELEASE LINER ON THE MARKET. YOU CAN CHECK THE PRINTABILITY, TACK PROPERTIES AND EASE OF RELEASE OF THE PRESSURE SENSITIVE SHEET STOCK YOU NEED NOW. WRITE OR PHONE STIXIE AND ASK FOR HIS FREE BROCHURE, SAMPLES AND PRICE LISTS.

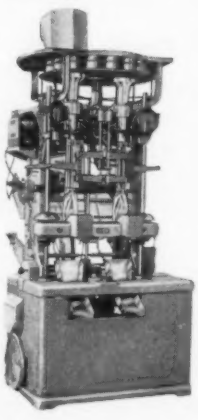
COATED PRODUCTS, INC.

275 Lincoln Boulevard • Middlesex, New Jersey • Elliot 6-3700
140 West 31st Street • New York 1, N. Y. • Oxford 5-0417

FMC Stokeswrap is "performance-proved" for dependable efficiency at Hershey

At Hershey Chocolate Corporation, the dependable, efficient operation of FMC Stokeswrap has been proved day after day for many years. A large battery of these machines is used to pouch-package a wide range of products such as Hershey-ets, candy-coated mint chocolates, milk-chocolate-covered almonds and Hershey Miniatures in both cellophane and heat-sealable paper.

Hershey is one of many well-known food packagers who depend on the proved design of FMC Stokeswrap for maximum production and minimum maintenance. The Stokeswrap handles practically all heat-sealable materials including polyethylene with models for pillow, four-seal and strip packages. Two and four-tube machines are available with pocket, auger, tablet counting, net weight or liquid feed systems offering a high degree of accuracy and a top speed of 240 packages per minute. Electric eye control with constant web tension assures accurate registration. Capacities range upward to 1½ pounds depending on product.



For complete details, write for your copy of Stokeswrap Bulletin P-801.

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION
FMC Packaging Machinery Division
Stokes & Smith Plant
4994 SUMMERDALE AVENUE, PHILADELPHIA 24, PA.

For more information circle No. 218 on Reader Service Card
Circle No. 219 on Card ▶

Gas-glo
LAWN LITES
For pennies a day—you too can have all the advantages of GAS-GLO AT THE LAKE PATIO DRIVEWAY STEPS
Gas-glo
Gas-glo
Gas-glo

In-store display of Bruest, Inc. Gas-Glo Lawn Lites.

New inner packing which holds Lawn Lites firmly in place — prevents glass breakage.

HOERNER-DESIGNED CORRUGATED CONTAINER

REDUCED DAMAGE CLAIMS BY 83%

Bruest, Inc. of Independence, Kansas manufactures the well-known Gas-Glo Lawn Lite. These attractive lights add grace and distinction to homes throughout the country.

One of the problems Bruest, Inc. faced in shipping their fine products to dealers was glass breakage. Damage claims amounted to a sizable figure. Bruest wanted a shipping container that would withstand the rigors of handling and shipping — provide protection for their lamps.

A Hoerner Packaging Engineer* helped Bruest solve the breakage problem. A new inner packing was designed to hold the lamps firmly in place and give the corrugated container added strength. The new container helped reduce damage claims by 83%. It also cut packing time to one-half and saved Bruest, Inc. over $4,000 last year.

In addition to protecting the product, the new container serves as an attractive carton for window and island displays.

How a Hoerner Packaging Engineer can help you

If you package things, call the Hoerner plant nearest you. A Packaging Engineer will study your operation without obligation. He can increase your profit margin by reducing labor and material costs and shipping losses. All through improved packaging with corrugated. Call today.

**The Packaging Engineer responsible: R. P. Laster*

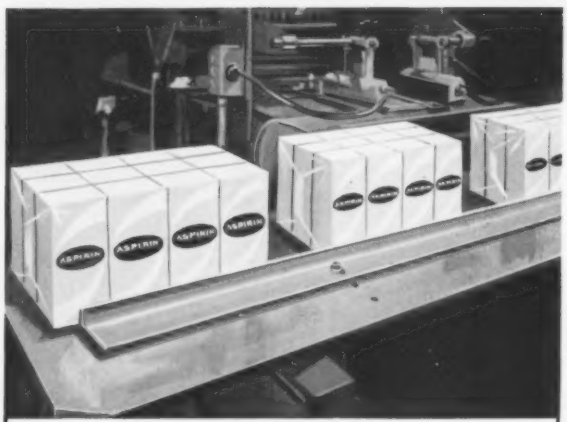
HOERNER BOXES, INC.

Corrugated Specialists for Mid-America

GENERAL OFFICES: 600 Morgan Street, Keokuk, Iowa • PLANTS: Fort Smith and Little Rock, Ark.; Des Moines, Keokuk and Ottumwa, Iowa; Danville, Illinois; Minneapolis, Minn.; Tupelo, Miss.; Springfield, Missouri; Sand Springs, Okla.; Sioux Falls, South Dakota; Fort Worth and Mission, Texas • ASSOCIATE: Cajas y Empaques Impermeables, S.A., Mexico City D.F., Mexico

Bundle your fr

AVISCO®



to save money

Manufacturers of products as varied as drugs, cigars, cosmetics, candy, razor blades and camera film are saving money by bundling with Avisco cellophane. It eliminates the need for printed or labeled boxes and paper overwraps; operates more efficiently on wrapping machines; seals quickly and securely with heat, thus ending the gluing operation. Cellophane offers new packaging flexibility over boxes because bundle sizes can be changed simply by adjusting the machines. It also reduces shipping carton sizes, shipping weights, and warehouse space needed to store packaging materials.

to help your distributors

Any distributor who ships products to retail outlets recognizes bundling as a source of operational savings. But his savings are even greater when Avisco cellophane is used for this purpose. Taking inventory and making up orders become easier with bundles in Avisco cellophane. Its pure transparency permits product visibility from the top, bottom and all 4 sides of the bundle. The results are instant identification, faster count and reduced shipping errors. And nothing compares with cellophane for sealing in freshness and protection against dust, dirt and moisture. This means longer shelf life.

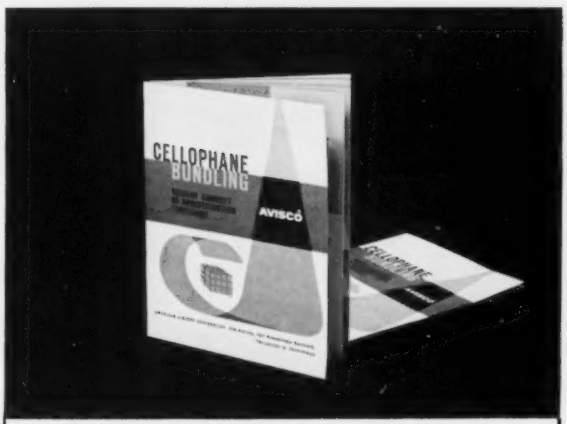
AMERICAN VISCOSE CORPORATION. FILM DIVISION, 1617 PENNSYLVANIA BOULEVARD, PHILADELPHIA 3, PENNSYLVANIA

ur fraction-of-case units in

OCELLOPHANE

to help your retailers

Retailers benefit in many ways when they receive fraction-of-case units bundled in Avisco cellophane. Bundles of a product can be conveniently stored next to individual packages remaining on the shelf. Retailers can see at a glance how much stock they have and what needs to be ordered. They can use the bundles as shelf displays without unwrapping. Cellophane bundling also facilitates mass displays during special promotions. In some instances it has even helped retailers sell entire bundled quantities to consumers. It also eliminates disposal problems caused by bulky cartons and wraps.



to help yourself

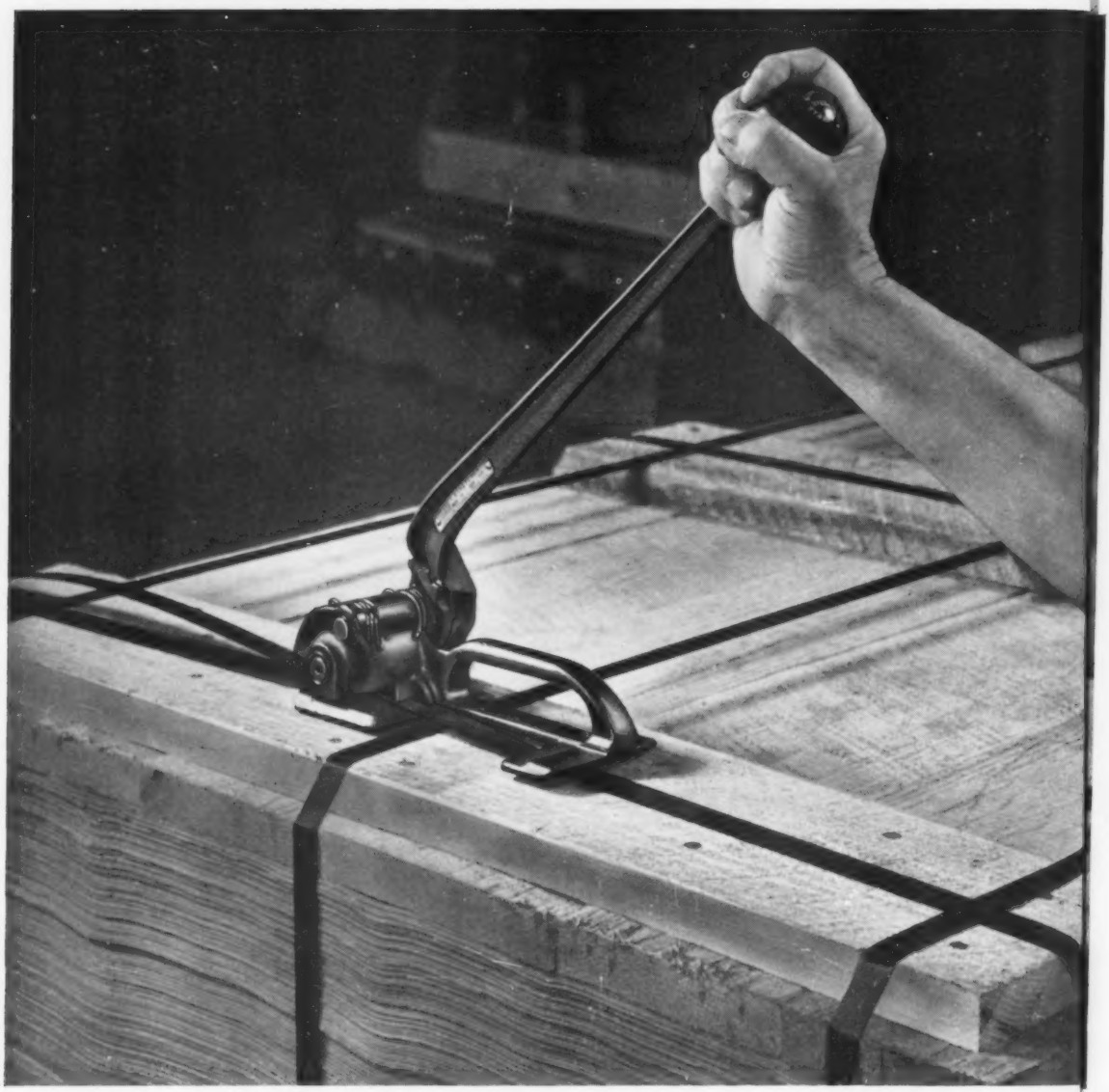
Learn more about this new and better method of redistribution packaging. Send for our booklet, "Cellophane Bundling". Better still, phone or write us for an appointment with our representative in your area or a selected cellophane converter specializing in your field. Our complete packaging service is available to assist you and demonstrate how Avisco cellophane, plain or printed, will answer your requirements better and more economically than any other packaging material.

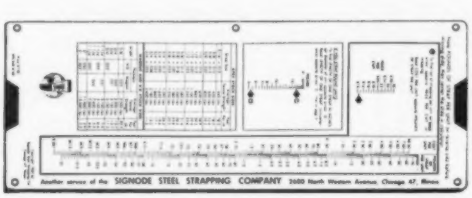
Look to AVISCO® fibers and packaging films for new ideas

AVISCO®

SALES OFFICES ALSO LOCATED IN ATLANTA, BOSTON, CHICAGO, DALLAS, LOS ANGELES AND NEW YORK

BUNDLE...BOX...





New free Steel Strapping Calculator helps you buy steel strapping at least cost according to your needs, and shows new strength figures for Signode steel strapping. Let us send you one.

X...BALE

If you tie your shipments... here are 12 pointers to superior results at less cost

1 • Steel strapping is strong. Even our smallest size has a tensile strength over 400 pounds; our largest, over 15,000 pounds. This strength is unaffected by age, heat, cold, moisture, or dryness.

2 • And it is low in cost. For equal lengths of equal strength, we haven't found anything that costs less than steel.

3 • You can pull high tension with steel strapping, and it holds without stretching. This tension is what binds your load together, or reinforces your package.

4 • Signode steel strapping is a quality product, carefully made and constantly improved to do its job better. It is available from Signode in a wide range of sizes.

5 • Because it is well made, Signode steel strapping is smooth, pleasant and safe to handle.

6 • It is firm and straight, easy to put on square, without kinks, twists, or tangles.

7 • It is flexible enough to loop easily around a package or bundle and to pull tight around corners.

8 • It is joined by a visible, inspectable mechanical seal that is dependable in spite of dirt, moisture, or oil. This seal can show your trademark in colors.

9 • It cannot be slipped on and off your package, bundle or bale... prevents pilferage.

10 • It can be applied at any desired speed, without waste, with fast Signode hand tools, power tools, and automatic machines.

11 • Signode men train your operators, keep Signode tools in good order, suggest ways to reduce your cost and improve your results. Signode has specialized in steel strapping for over 45 years.

12 • There are three Signode manufacturing plants, each with its own sources of steel, to assure you of the steel strapping you need, even in times of shortage.

SIGNODE

First in steel strapping

SIGNODE STEEL STRAPPING CO.

2690 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide

In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

Want more profit from your Packaging Operations?

. . . without replacing present equipment, or building a new plant, or even hiring more people!

Check your adhesive. That's where some profit opportunity lies. Because the adhesive is one of the controls that govern your rate of production. And production is profit. Obviously, the more production you can get from your present packaging setup, the more profit you will earn.

Therefore, the speed, machine-ability and tack of your adhesive are vital. Your adhesive must do much more than just "adhere".

Swift's new high speed resin adhesives have stronger tack with better machine-ability. And what's more, they have higher strength and greater resistance to moisture as well! Swift's 23 adhesives plants produce a complete line of packaging adhesives for the most specific applications—prompt, courteous, *and* authoritative service throughout the United States and Canada.

Be sure your packaging adhesive *is* helping your profit. Call your Swift Adhesive Specialist for all your adhesives. Or write for additional details to Swift & Company, Adhesive Products Department, Chicago 9, Illinois.

A-53R

To Serve Your Industry Better

WITH THESE ADHESIVE PRODUCTS

RESINS AND RUBBERS IN EMULSION OR SOLVENT • DRY, LIQUID AND FLEXIBLE ANIMAL GLUES • LIQUID DEXTRIN ADHESIVES

Swift

105TH YEAR

19986
19987
19988
19989
19990
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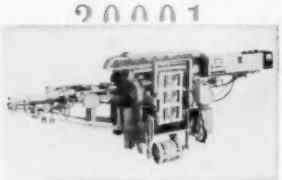
20000
20001

If your daily packaging includes at least 20000 overwraps



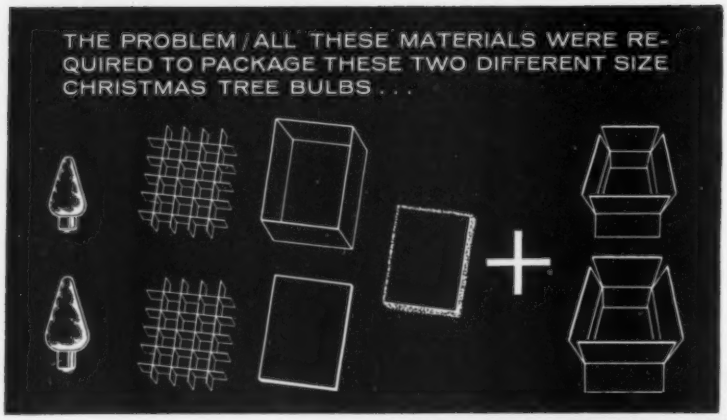
...Battle Creek Machines can probably wrap them better, faster,

more economically than any other

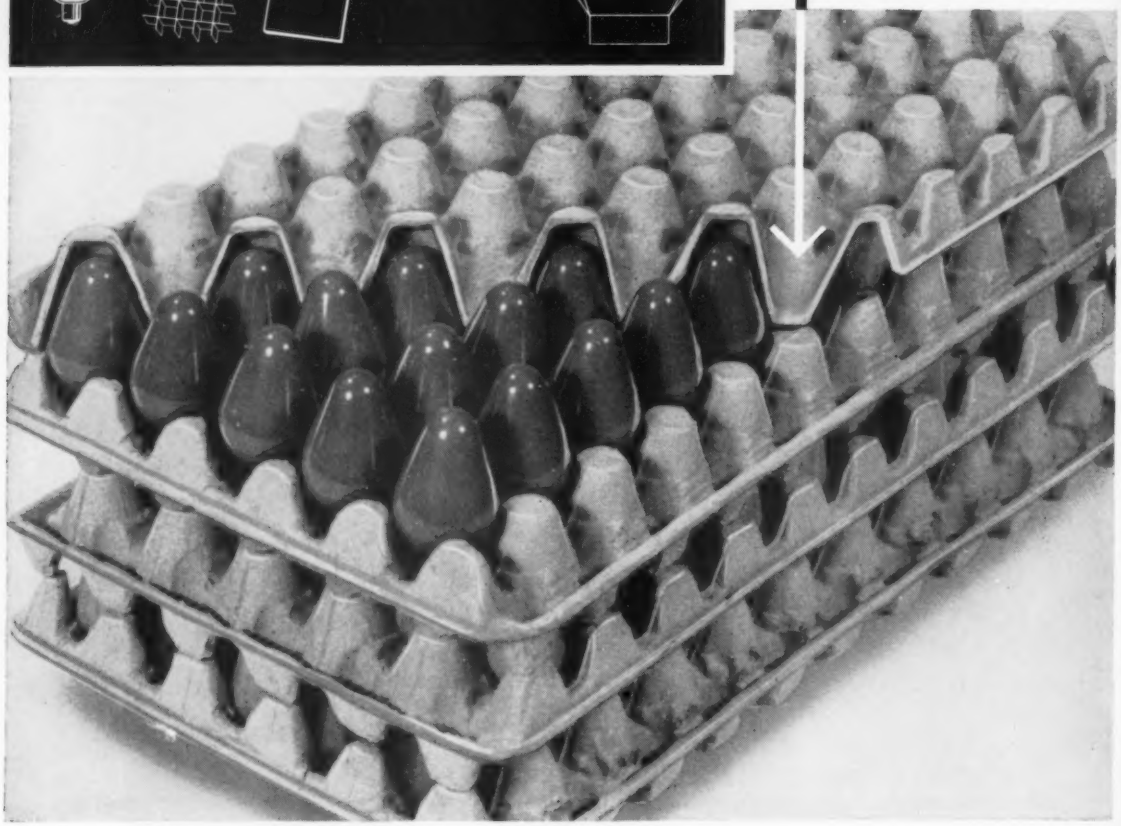
Where high speed is imperative, the Model 51 is the preferred choice of food processors. Quiet "Continuous Flow" operation creates tight overwraps of dry cereals, dried fruits, cracker boxes, frozen foods in heat sealing cellophane, laminated papers, wax coated papers or heat sealing foil. Phenomenal 200 per minute speeds eliminate bottlenecks since the output of previous machines is matched or exceeded . . . and an automatic infeed excludes need of an operator. Available in two ranges: 3½"-5½" or 6"-11" for lengths, 2½"-4¼" widths and ¾"-2¼" heights. Ask about the Model 51 today.

Continuous Flow® PACKAGING

BATTLE CREEK *packaging machines, inc.*, BATTLE CREEK, MICH.



Another problem solved with Keyes Custom Molded Packaging



NOW BOTH SIZE BULBS ARE PACKAGED WITH A SINGLE MOLDED PULP TRAY AND STANDARD BOX

Let Keyes Product Development Engineers show you how to cut costs, cubage and breakage with custom molded packaging

Molded pulp is the one inexpensive packaging that combines rigidity with remarkable cushioning properties. This packaging material can be molded to the shape of your product . . . eliminating the need for set-ups, cell partitions, fillers, pads and loose packing material. If you'd like to learn how Keyes Custom Molded Packaging can cut your costs, cubage and breakage, write:

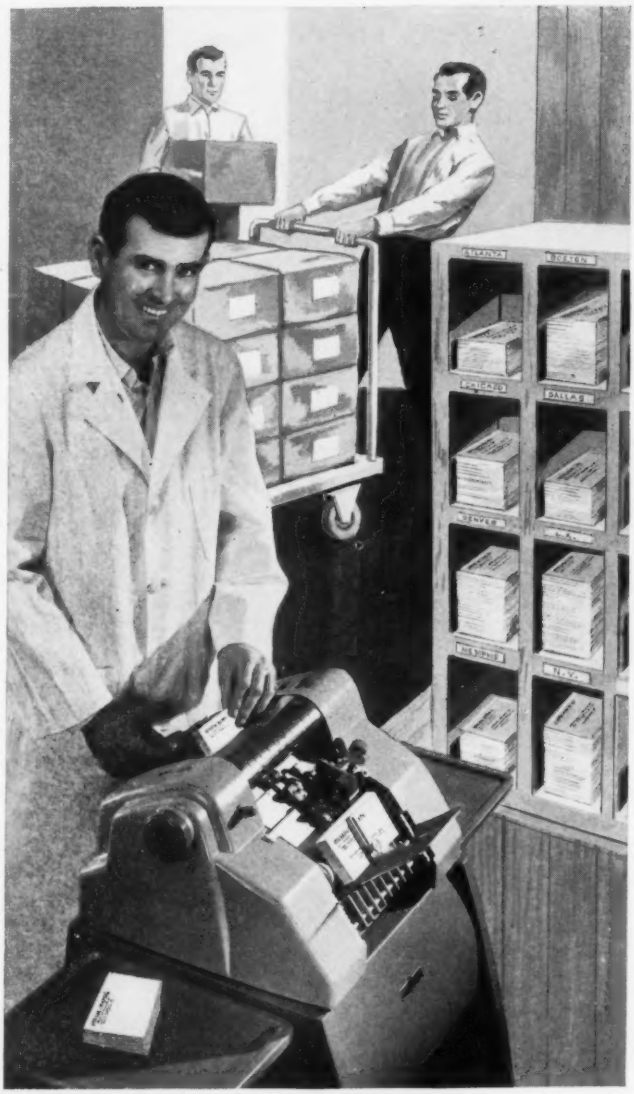
Product Development Division, Dept. PE-10

Keyes Fibre Company, Waterville, Maine

KEYES MOLDED PRODUCTS

Shipping labels

addressed in advance—with a Tickometer



One big retail chain imprints addresses of branches on shipping labels with a Tickometer – always has a supply of addressed labels. A small firm with a limited number of regular customers, uses the Tickometer for the same purpose.

Advantages: Time saved in the shipping department. Time saved in addressing. Cheaper than pre-printed labels, and no big inventory of addressed labels is necessary.

• The Tickometer is a tremendous time saver in any office. It imprints, marks, codes, dates – labels, wrappers, envelopes, small cartons, sales slips, office forms, coupons, tags, certificates, etc., at speeds from 400 to 1,000 a minute. It handles paper and light card stock, in sizes from 1 by 2 to 15 by 15 inches. Feeds and stacks automatically. It is easy to set and operate. Can be used by anybody.

• The Tickometer is a precision counting machine also – so accurate that banks use it to count currency. It records partial totals, and can be set for a pre-determined count. With attachments it will sign and endorse checks, do consecutive numbering.

• The Tickometer can be bought or leased. Pitney-Bowes service is available from 320 points. Call the nearest PB office and ask for a free demonstration of the Tickometer in your office. Or send coupon below for free illustrated literature.

Model 4800 Package Imprinter

Imprints folding cartons, containers, bags, etc. up to 7,500 an hour, as needed – reducing inventories and waste. No tools required, can be operated by anybody. Ask for a demonstration, or send coupon.

Pitney-Bowes

TICKOMETER

Imprinting & Counting Machine

Made by the originator of the postage meter . . .
139 offices in U.S. and Canada.

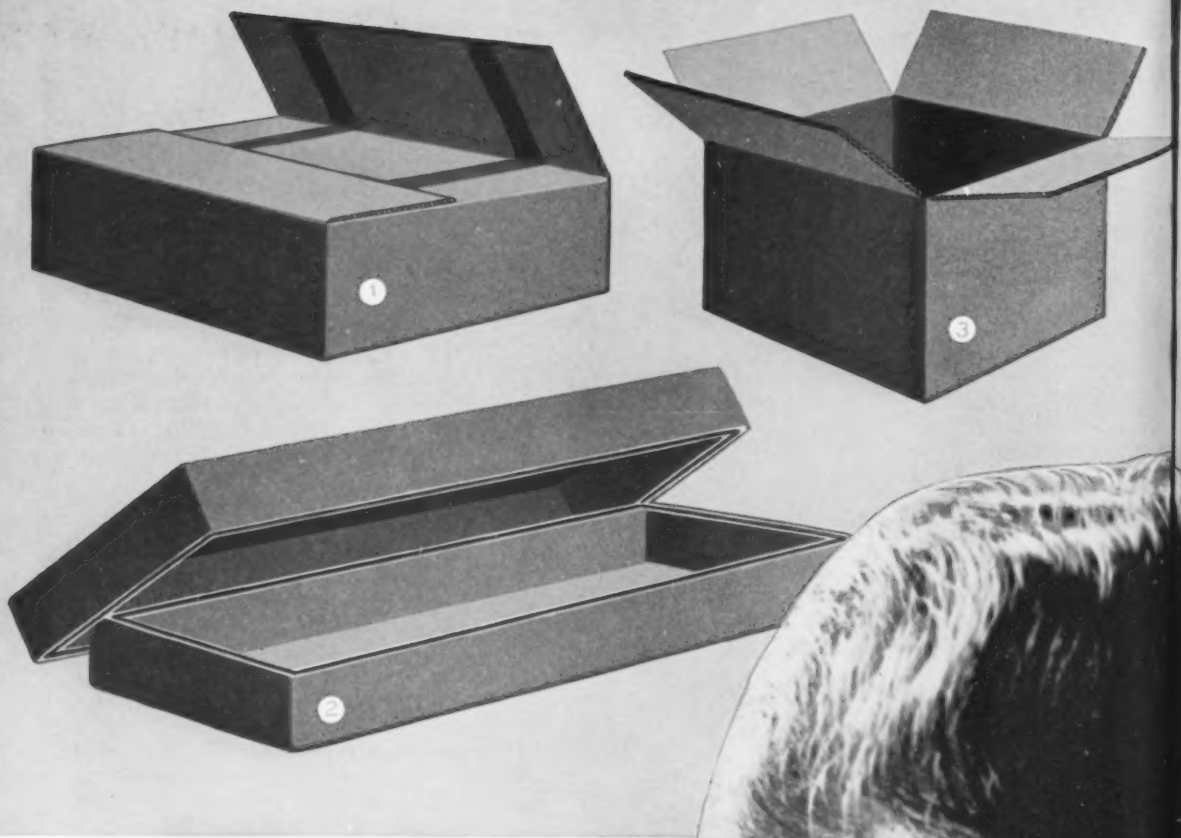
PITNEY-BOWES, INC.
7737 Walnut Street
Stamford, Conn.

Send free illustrated booklet and case studies on:
☐ *Tickometer* ☐ *Package Imprinter*

Name _____

Address _____

WHEN YOU NEED SHIPPING BO



THESE EXCLUSIVE NEW ST. REGIS® DEVELOPMENTS SHOW THE IMAGINATION AND VERSATILITY OF OUR PACKAGING ENGINEERS WORKING TO SERVE YOU:

1 **PRESSEAL®** – the most advanced achievement in self-sealing corrugated boxes; no wet glue, no stitching or taping; the adhesive is *built in* . . . seals only when your box is set up and ready to use. Ideal for field-packing produce and for industrial packagers with no automatic equipment.

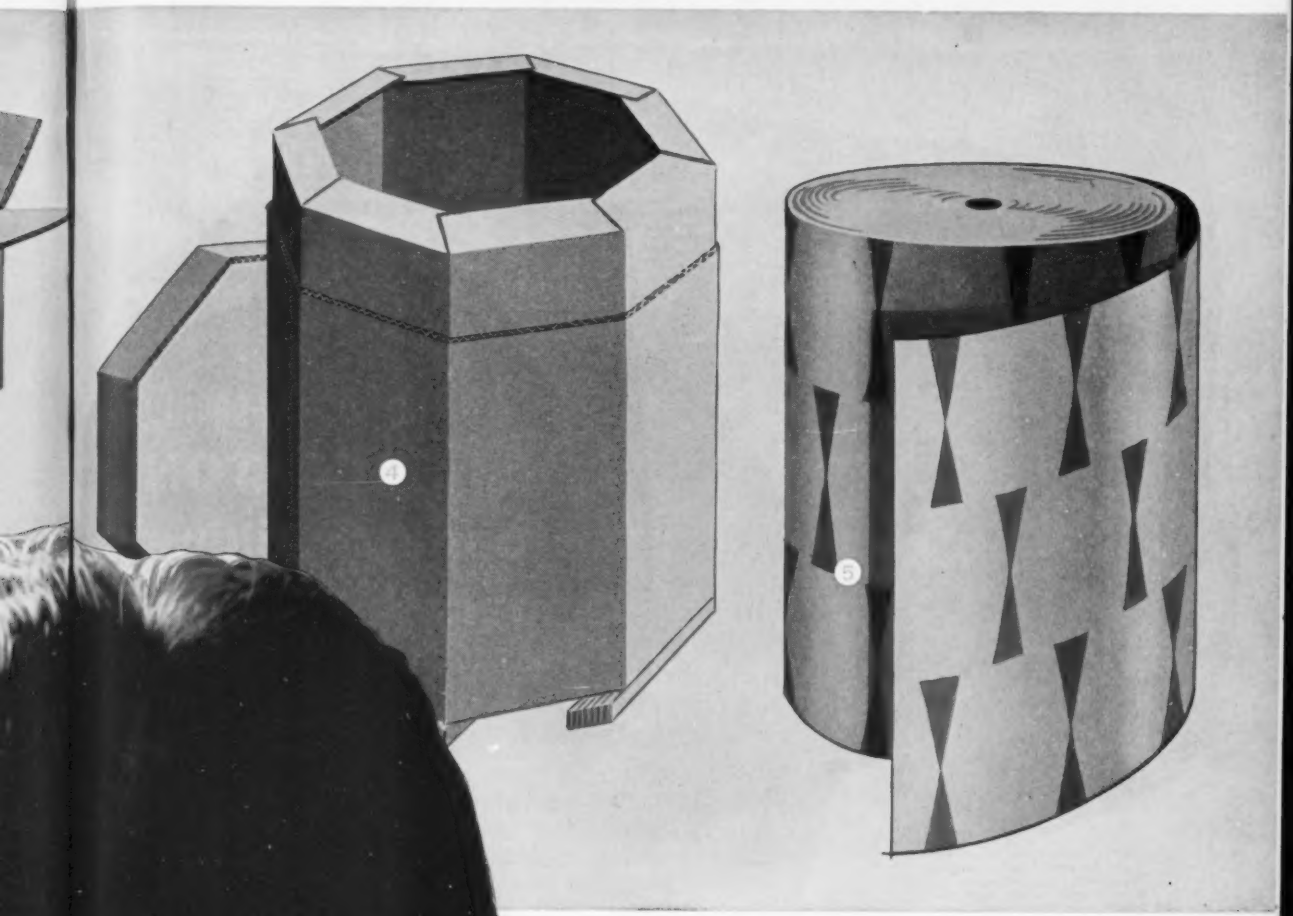
2 **FOME-COR** – a lightweight protective material with remarkable insulative powers . . . highly successful in guarding glass-packed inflammable acid; in shipping cut flowers fresher and cheaper. Boxes of any design may be made of Fome-Cor.

3 **WET-LOK** – Impregnated, water-tight corrugated cartons that stay rigid under gallons of water, tons of ice . . . will protect fresh fruits and vegetables over cross-country routes with far less bruising or spoilage. The only box of this type that holds up *test after test.*

4 **THE FAMILY OF BULKPAKS**–Six giant-size designs meet the specifications of bulk loads, permit free-flowing materials to be shipped in bulk with great economy, safety and handling efficiency.

5 **PREPRINT CORRUGATED**–Specially-developed process assures superior registration, brighter colors, sharper detail. Trademark, brand identification and selling message stand out for attractive display, more sales appeal.

G BOXES...USE OUR IMAGINATION



From a nationwide family of fine St. Regis corrugated plants, you'll gain in many ways: Well-seasoned, imaginative designers serve you on both local and national levels • Consistent quality is assured from St. Regis tree to St. Regis box • New packaging materials continually emerge from a fully staffed research department • And you'll enjoy working with the friendly, experienced people who *are* the St. Regis Container Division!

Anything goes . . . in a St. Regis container!

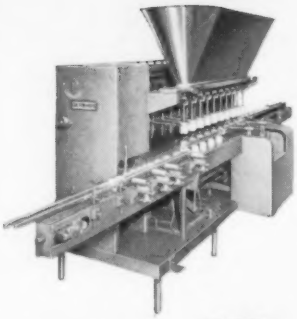
CONTAINER DIVISION

St.Regis PAPER COMPANY

150 EAST 42ND STREET, NEW YORK 17, N.Y.

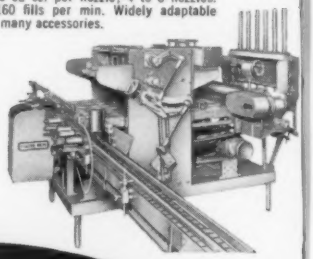
PLANT LOCATIONS: BIRMINGHAM, ALA. • FULLERTON, CALIF. • SALINAS, CALIF. JACKSONVILLE, FLA. • CHICAGO, ILL. • DUBUQUE, IOWA • HAGERSTOWN, MD. • MINNEAPOLIS, MINN. BUFFALO, N.Y. • ALBANY, N.Y. • CANTON, OHIO • CLEVELAND, OHIO • COSHOCTON, OHIO • NEWARK, OHIO • CRAFTON, PENNA. • MT. WOLF, PENNA. • PITTSBURGH, PENNA. • DALLAS, TEXAS • GARLAND, TEXAS • HOUSTON, TEXAS • TACOMA, WASH. • GRAFTON, W. VA. • MILWAUKEE, WIS.

For more information circle No. 225 on Reader Service Card



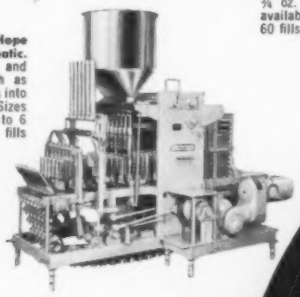
No. 19A Colton-Hope High-Speed Automatic. Fills liquids, creams, pastes into bottles, jars, cans. ⅛ oz. to 32 oz. per nozzle; 4 to 14 nozzles. Up to 250 fills per min. Many accessories available.

No. 19 Colton-Hope High-Speed Automatic. Fills liquids, creams, pastes into bottles, cans, jars. Excellent for filling, top-finishing, disc-placing in cosmetic cream work. ⅛ oz. to 32 oz. per nozzle; 4 to 8 nozzles. Up to 160 fills per min. Widely adaptable through many accessories.



No. 15RF2 Colton-Hope Two-Line High-Speed Automatic. Fills liquids, creams, pastes into glass, plastic, tin, paper containers. ⅛ oz. to 32 oz. per nozzle; 1 or 2 nozzles available. Many outstanding features. Up to 60 fills per min. Many accessories available.

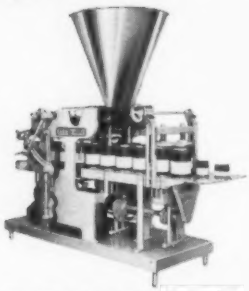
No. 27 Colton-Hope Heavy-Duty Automatic. Fills high viscosity and ropy materials such as caulking and greases into tubes or cartridges. Sizes up to 2" x 10"; 2 to 6 nozzles. Up to 90 fills per min.



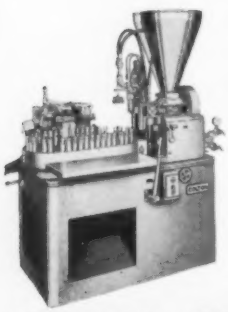
PACKAGING MACHINERY MANUFACTURERS INSTITUTE PMMI

The money-saving precision of **COLTON** **exacto-metric filling** plus **high operating speed** make basic Colton fillers the big buy

These basic fillers typify the wide range of filling covered by the Colton line—most complete and versatile in the world. Such basic machines, readily adaptable to individual application by means of accessories engineered to the machine, give, in effect, a custom-engineered machine at standard machine price. It is this adaptability that enables us to say "Colton fills practically ANYTHING into ANYTHING." Many other Colton fillers available. Write for Filling Machine Application Data Sheet. Detailed specification sheets available. Arthur Colton Company, 3400 E. Lafayette Ave., Detroit 7, Michigan. Sales and Service offices throughout the country. Plants: Detroit, Mancelona, Elk Rapids, Michigan.

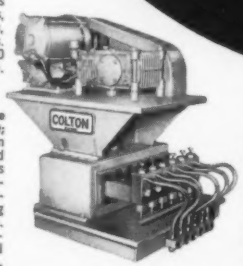


No. 21 Colton-Hope Single and Twin Automatic Conveyorized Heavy-Duty Filling Machine. For filling liquids, creams, light and heavy pastes such as paints and similar products into jars and cans. Production up to 10 cycles per minute per nozzle. Fills up to 1 gallon per nozzle. 1 and 2 nozzles available. Paint can lid dropping and pressing features available.



No. 175 Colton Automatic Tube Filler, Closer and Crimper with Ejector.* Fills liquids, creams, pastes into tubes, small bottles, jars, cans. Cleans, fills, folds, crimps, ejects. Various fillers offer 30 to 300 tubes per min. per machine.

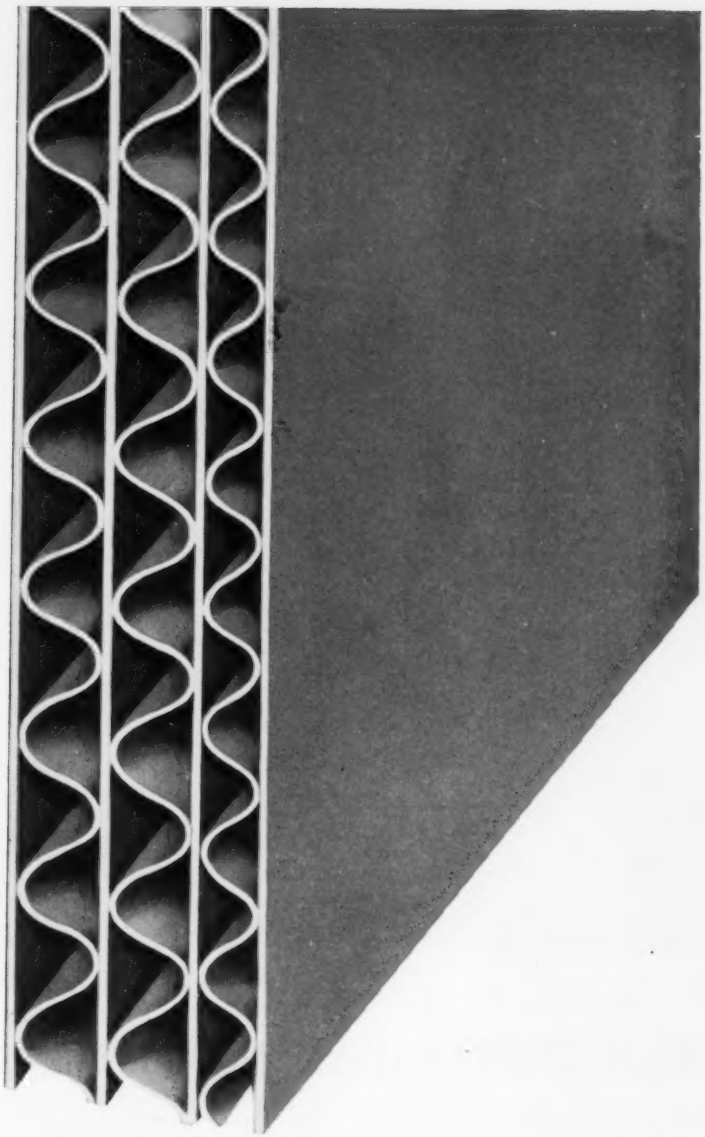
***No. 176 Plastic Tube Sealing Attachment;** low cost conversion unit to replace standard folding heads on Models 17TF and 175TF machines. Gives dual-purpose machine handling metal or plastic tubes. Model 172 Colton exclusively for high speed sealing of plastic tubes.



Series 100 Colton High-Speed Multiple Liquid Fillers, (for bench or conveyor belt use). Fills liquids into jars, bottles, cans. Up to 4 fl. oz. per nozzle; 4 to 12 nozzles. Up to 480 fills per min. Can be manifolded for larger fills. Extreme accuracy, high production in a low-cost machine.

Call Colton
FOR EVERY FILLING NEED

COLTON fills practically ANYTHING into ANYTHING



We have been officially informed by the U. S. Government Patent Office that on August 16, 1960 we were granted U. S. Patent 2,949,151, giving us further protection on triple-wall corrugated products. This follows the issuance of our first patent, U. S. Patent 2,759,523. Other patents are pending.

Tri-Wall Containers, Inc.

799 Washington Street, New York 14, N. Y.

WORKING TO ADVANCE THE USEFULNESS OF CORRUGATED

Container manufactured by Owens-Illinois

For ton-and-a-half oil heaters—

Giant Bostitch-stapled carton slashes packing costs 50%

Texsteam Corporation, Houston, Texas, used to ship 3000-pound oil heaters in wood crates. Each crate was built around a heater and was the size of a small room . . . seven feet long, seven feet high and three feet wide. Crates were costly to make and to ship. They were heavy, time-consuming to build and hard to handle. Here's how Bostitch helped.

An unusual—and unusually large—corrugated container proved to be ideal. It's a sleeve with a Bostitch-stapled seam. A cap, stapled in place, forms the top. The burner is bolted on a wood pallet, then sleeve and cap go over the burner. A heater can be packed in a fraction of the time.

Texsteam reports savings of 50% for the new container over the old. The new carton weighs less and has cut freight costs substantially. Shipments have been completely damage-free.

Texsteam gained many advantages and worthwhile savings in the change to Bostitch-stapled containers. Many companies do. If you would like to know how a change might benefit you, talk to a Bostitch Economy man. To call him, look under "Bostitch" in your phone book. Or write us direct. See how much you can save when you use Bostitch in your shipping room.

Fasten it better and faster with

With every Bostitch machine you get...
the right combination for your needs from 800 staplers and over 200 staples . . . nation-wide parts, service and technical aid backed by the industry's most modern factory . . . assurance that Bostitch products will operate to your complete satisfaction.

BOSTITCH®
STAPLERS AND STAPLES

870 BRIGGS DRIVE, EAST GREENWICH, RHODE ISLAND

For more information circle No. 228 on Reader Service Card

Circle No. 229 on Card ►

New paper withstands 90% humidity for 360 hours

(More packaging news from International Paper)

Read how this new moneysaving kraft paper withstood two weeks of constant high humidity.

To prove the moisture-resistant quality of International Paper's new Hy-poly kraft, we subjected it to this severe test.

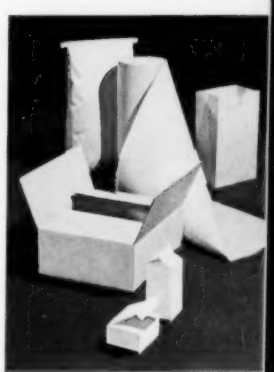
The Hy-poly bag was filled with an extremely hygroscopic chemical and *steamed* in 90% relative humidity at 100° F. for 360 hours. (Unprotected, under these conditions, the test chemical takes on 2½ times its weight in water in about *one hour.*) When the bag was opened, 15 days later, the crystals were as *dry as sand.*

New Hy-poly not only resists humidity, it saves you money, too. From $2 to $16 per thousand multiwalls. And with a coating about *half as thick* as medium- and low-density sheets, you get equal, if not greater, moisture-vapor protection.

Hy-poly is available in both bleached and natural Gator-Hide® kraft and in our new Gator-Hide Extensible Kraft.

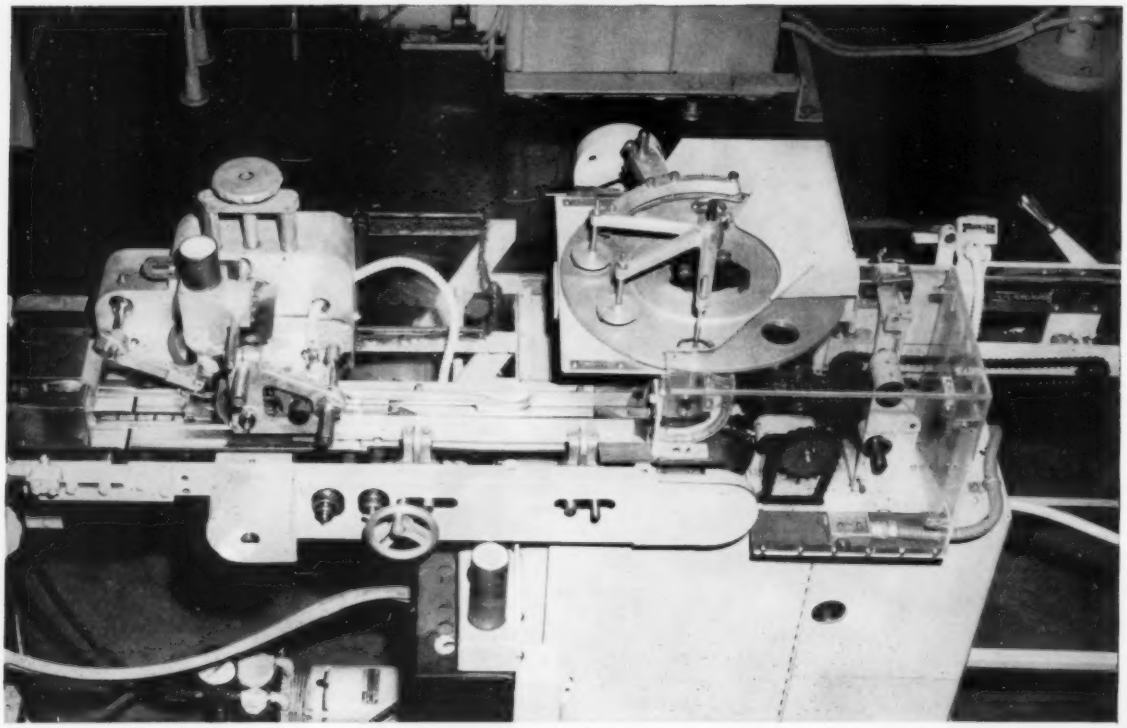
The constant development of new packaging papers requires vast resources, skilled craftsmen and modern facilities. We have all three.

That is why International Paper can provide you with the widest range of papers, boards and packaging assistance in the industry. Call us or contact your converter—he's probably been doing business with us for years.



INTERNATIONAL PAPER New York 17, N. Y.

Manufacturers of papers for magazines, books and newspapers • papers for home and office use • converting papers • papers and paperboards for packaging • shipping containers • folding cartons • milk containers • multiwall bags • grocery and specialty bags and sacks • pulps for industry • lumber, plywood and other building materials



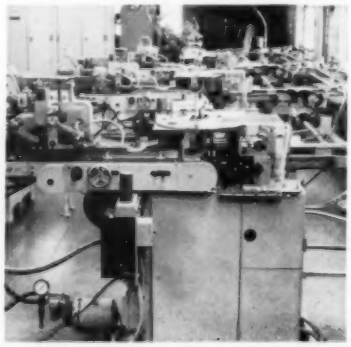
Wrapping coils of stamps at up to 75 per minute, the CKDW provides a moisture-proof package of heat-sealed plastic film. Specially-designed labeler accurately applies labels.

Crompton & Knowles Packaging Corp. licks a stamp problem.

A tremendously increased demand for postage stamps in coils rather than in the familiar sheet form posed a packaging problem for the U.S. Bureau of Engraving and Printing. The problem: to rapidly and efficiently wrap, label and seal coils of 100, 500, 1,000 and 3,000 stamps in moisture-proof packages having maximum security.

The solution was provided by a Crompton & Knowles CKDW wrapping machine, designed especially to meet the unique requirements. Operating at speeds up to 75 packages a minute, the CKDW wraps each roll in plastic film, accurately places a label over the folds and finally heat seals the entire package. The machine's versatility allows change-overs from one size coil to another to be made in a matter of minutes. Fifteen of these units are currently in operation at the Bureau.

Highly-specialized engineering performance like this is evidence of Crompton & Knowles' ability to solve all your packaging problems. Whether you require a single machine wrapping a standard product . . . or a completely integrated project to develop totally new concepts of packaging, consult C & K, makers of high-speed, automatic machinery for wrapping, packing, case forming, sealing and gluing, can palletizing and depalletizing. For full details, including leasing arrangements, write Crompton & Knowles Packaging Corp., Holyoke, Massachusetts, U.S.A.



Battery of wrapping machines is automatically fed with coils of stamps from belt conveyor.

CROMPTON & KNOWLES
C&K
PACKAGING CORPORATION

Stands out in PACKAGING

National Sales and Service Offices: NEW YORK
CHICAGO • LOS ANGELES • ATLANTA • DALLAS
CLEVELAND • BERKELEY, CALIF • SEATTLE
WINTERHAVEN, FLA. • TORONTO • MONTREAL

GOODYEAR

Surest solution to a packaging puzzle

...a Vitafilm OVERWRAP

This picture proves you can solve a packaging puzzle neatly and attractively with an overwrap of VITAFILM. And it proves something else, too.

If you're packaging hard goods or any hard-to-wrap item, you can find the same easy solution by calling your Goodyear Packaging Engineer. He'll show you how a VITAFILM overwrap can speed sales, prevent damaged goods, reduce returns. Goodyear, Packaging Films Dept. V-6432, Akron 16, Ohio.

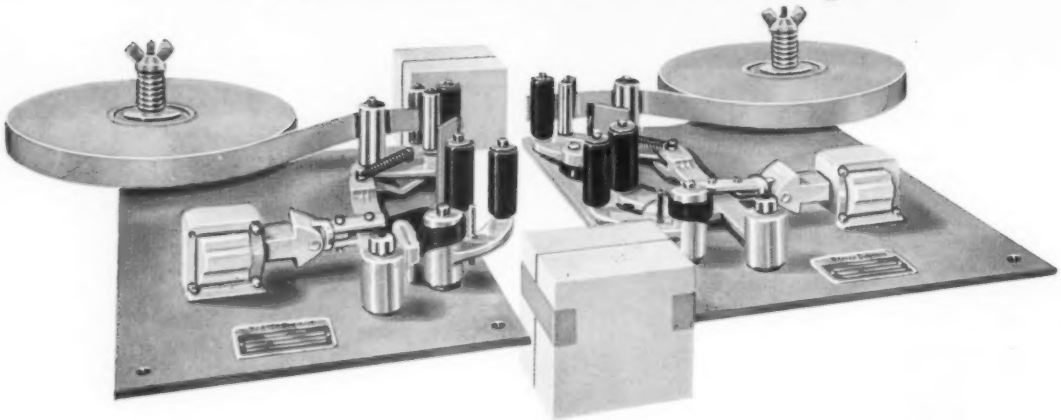
Lots of good things come from

GOODYEAR

Vitafilm, a Polyvinyl chloride—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

COMBINE

up to 75 units a minute with "SCOTCH" BRAND Tapes



You can form eight combination deals with the "SCOTCH" BRAND S-69 Combination Bundler in the few seconds it takes you to read this sentence. That's 3M-Matic Taping in action!

Quickly and securely, short clips of tape bundle two or more units together to form combination offers, or attach premiums to products. Mounted on conveyor lines, "SCOTCH" BRAND Combination Bundlers can be adapted to handle a variety of package shapes and sizes. Tapes are clean running, stick tightly, and are supplied in a variety of vivid colors. Can be printed with special sales messages too.

Discover how you can save time and money with "SCOTCH" BRAND Tapes and 3M-Matic Taping methods. Tape is also economical and fast for hand bundling operations.

What's your bundling problem? Boxes . . . bottles . . . cans . . . tubes? Chances are your 3M Representative can solve it for you. Ask your local "SCOTCH" BRAND Tape Distributor or write: 3M Co., 900 Bush Avenue, St. Paul 6, Minn., Dept. IAK-100.

When tape costs so little, why take less than "SCOTCH" BRAND?

REG. U.S. PAT. OFF.

SCOTCH BRAND

Tapes for Packaging

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN. EXPORT: 99 PARK AVENUE, NEW YORK 16. CANADA: LONDON, ONTARIO.

For more information circle No. 232 on Reader Service Card

A cheaper way to package parts or kits

New Sundstrand-Packmaster produces up to 9000 heat-sealed packages per hour — can be completely changed over in 15 minutes!

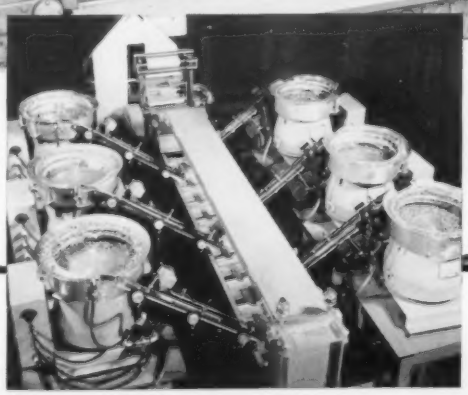
Nuts, bolts, or bearings . . . hasps or hinges . . . kits of hardware for over-the-counter sale — the all-new Sundstrand Model 50-A Packmaster offers unequaled versatility and economy for packaging an infinite variety of hard goods (and soft goods, too).

Whether you want airtight, moisture-tight protection or transparency for identification and promotion, or both, the Packmaster answers the need. Packages ranging in size from 2″ to 8″ wide and 2″ to 16″ long are made of heat-sealable foils, films, or papers — transparent or opaque both sides, or transparent one side and opaque the other.

Write for new 50-A Bulletin today. For complete recommendations, submit samples and describe your requirements.

MARK OF SUNDSTRAND RELY-ABILITY

SUNDSTRAND-AMERICAN BROACH
ANN ARBOR, MICHIGAN
Division of SUNDSTRAND CORPORATION



AUTOMATIC HOPPER FEEDERS can be added to provide accurate counting and faster loading of nuts, bolts, screws, washers, etc., in individual packages or kits.

Film for bread wrappers extruded from Tenite Polyethylene by Fabricon Products, 1721 W. Pleasant Ave., River Rouge 18, Michigan

Film of **TENITE POLYETHYLENE** gives bread the look, the feel, and the seal that mean greater sales and fewer returns

Fabricon Products, *division of Eagle-Picher Company, uses medium-density Tenite Polyethylene to produce a tough, high-gloss, transparent bread wrapper*

Film extruded from medium-density Tenite Polyethylene is an ideal material for bread wrappers. Its use benefits both bakers and housewives.

Because it is so sparkling clear and so soft to the touch, consumers can *see* the goodness and *feel* the freshness of bread wrapped in a protecting film of Tenite Polyethylene. "Protecting" is a good description of the role played by this modern packaging material. Its high moisture-vapor transmission resistance acts to prolong freshness, while its toughness means a long-lasting wrapper that will not easily be torn or punctured. This toughness, by the way, is retained even at freezer temperatures. Finally, its good heat-sealability contributes much towards an air- and moisture-tight closure.

To bakers, film of Tenite Polyethylene brings the double economy of lower wrapping costs and fewer returns of "stales." On the wrapping line, bakers find film of Tenite Polyethylene has the proper stiffness and slip needed for efficient use on high-speed packaging machines. At the heat-sealing end, closures are simplified by the material's broad heat tolerance.

Like other leading suppliers of bread wrappers, Fabricon Products has chosen Tenite Polyethylene as its standard of quality, and vigilantly controls the extruding of "FAB-WRAP" film to develop the full measure of sparkle and clarity offered by this Eastman plastic.

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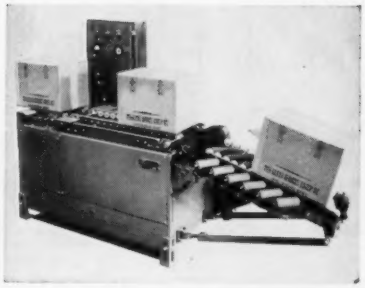

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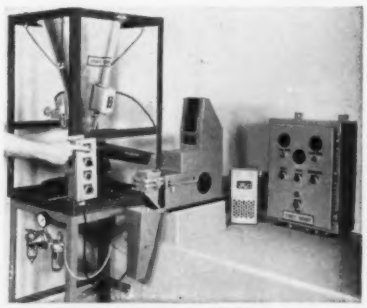

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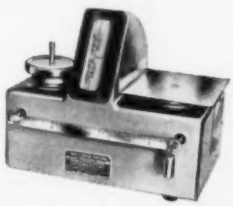

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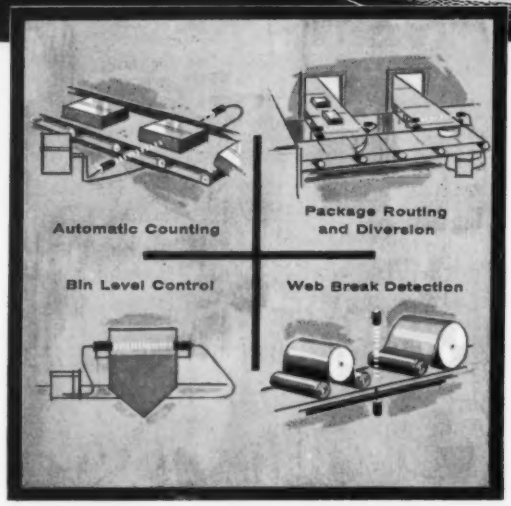

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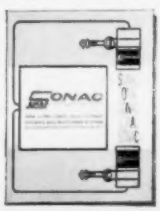

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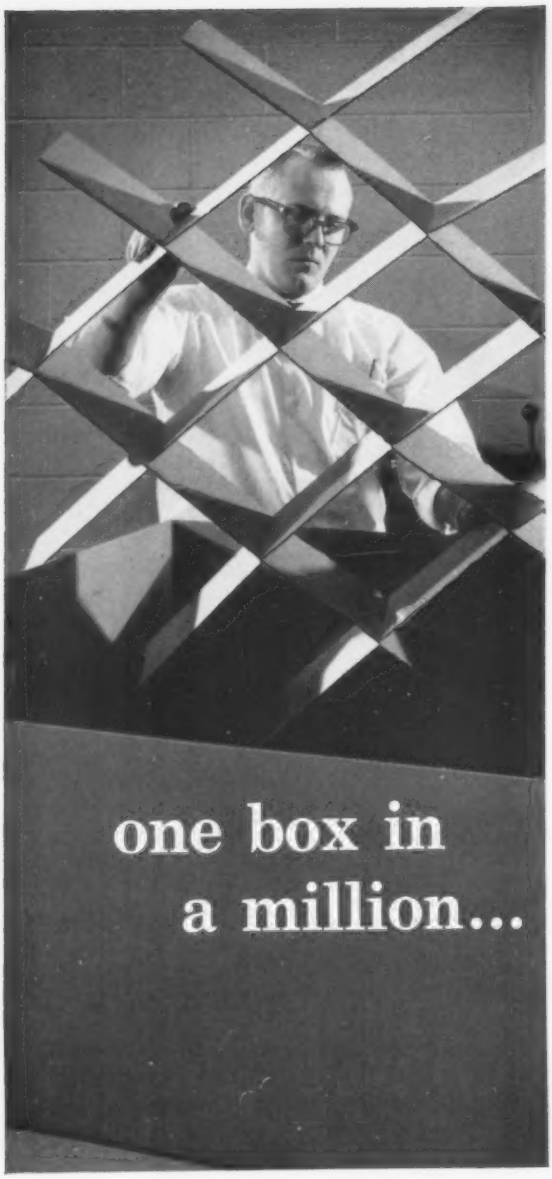

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How to develop and construct a single elliptical chart to control two interrelated filling variables simultaneously

Make 1 chart control TWO variables

By Walter L. Heilman,
Plant Statistics Engineer,
and Eugene U. Mariani,
Plant Methods Engineer,
Cincinnati Toilet Goods Plant,
The Procter & Gamble Company,
Cincinnati

Statistical quality control has become increasingly important in recent years in the packaging industry. Control of packaging variables is being accomplished almost exclusively through the application of statistical control charts.

Most of us are familiar with the single-variable control chart; however, charts which can *simultaneously control two related variables* are not widely used, although they are important and necessary. The purpose of this article is to present a method for developing such a statistical chart which will answer this requisite of controlling two related variables at the same time.

The Single-Variable Chart

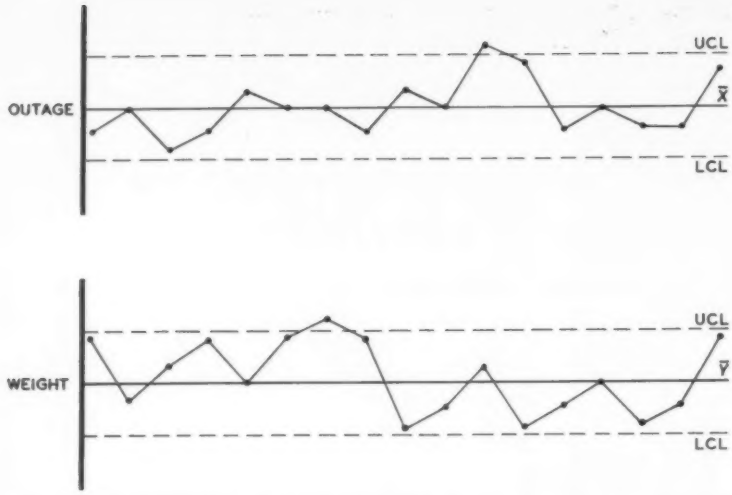
The chief problems encountered when attempting to apply the single-variable chart to simultaneous control are twofold:

First—and probably most important—is the fact that individual charts fail to give valuable information which can be brought out by a chart designed to simultaneously control both of two variables.

Second, although the probability is slight that, when in control, two variables will have extreme values at the same time, when this does occur, individual charts will not accurately reflect the true control situation.

To understand the application of control chart theory to bivariate

To boost the economy and efficiency of your packaging operation, you need precise control of variables on your line. Mr. Heilman and Mr. Mariani show how to develop a single chart to control two interrelated variables simultaneously. This gives, they say, a more accurate picture of a control situation than you get with two single-variable charts. Stressing the value of using one chart, they tell step-by-step how it evolves from two single-variable charts. Since this chart becomes an ellipse under certain conditions, they explain—with equations—how to calculate and plot the control ellipse. Their observations deserve close scrutiny by anyone involved in controlling the package filling operation.



1 TWO SINGLE-VARIABLE CONTROL CHARTS, each controls one of two interrelated variables with 95-per cent confidence. On this type chart, straight line represents mean ($\bar{X}$ or $\bar{Y}$); thus, control limits (UCL, LCL) are straight, as each is constant distance from mean.

distributions *(1, 3, 5)*, it is generally necessary to have at least a basic understanding of statistics and of control principles of a univariate distribution. To attempt to cover this basic material prior to going into the main subject of this article would make it unnecessarily long and too broad in scope. Therefore, we assume that the reader is generally familiar with statistical theory and basic control charting.

For the reader who may wish a quick review of the mechanics and theory of construction of statistical control charts, or who may be considering an initial plunge, we cite a three-part article on statistical control charting, published previously *(2)*.

An example involving two interrelated variables, to which this control chart is directly applicable, is the control of fill of a bottled liquid product. Both net weight and bottle outage (distance from the fluid level to the top of the bottle) are significant quality items. Weight control is important for overpack-underpack and legal reasons. Outage control is important primarily from a consumer appeal standpoint.

DEVELOP CHART

Before going into a specific example with detailed calculations, we will explain illustrative steps to show the progression from two individual charts to one single chart—one chart which correctly and simultaneously controls the two related variables of weight and outage.

In this discussion and in the example, control is to be maintained on the basis of individual outage and weight measurements. This method is the easiest to understand and administer. Control by subgroups is possible, but is not within the scope of this article.

Combine Two Single Charts

In considering the simultaneous control of bottle outages and net weights, assume equal variances and no correlation between the variables. Assume that these two variables are being controlled on the basis of two standard-deviation control charts (95-per cent confidence), as shown in Fig. 1.

To construct a simultaneous chart by using these two single control charts, let us rotate the outage chart 90° and superimpose it upon the weight control chart. The effect is the two-dimensional case as shown in Fig. 2, where the bottle filling operation is considered to be in control, with respect to weight and outage, *only* when the plot is within the shaded area. This is the case when both variables are simultaneously within their respective control limits.

Desired Confidence Changes

From the above, it would appear then that a simultaneous control

Why use one chart designed to control two interrelated filling variables simultaneously instead of using two single-variable charts?

A chart designed for simultaneous control:

- ► Gives valuable information which cannot be brought out by two single-variable charts applied to simultaneous control.
- ► Reflects the true control situation when two variables, in control, have extreme values at the same time (probability of latter is slight).
- ► Shows more indicative representation of "in-control" and "out-of-control" plots.
- ► Has quadrants which show the basic reason for any plotted point being out of control.
- ► Offers an accurate and significant picture of the situation affected by the two variables.
- ► Eliminates errors of over- and undercontrol.

chart for the two variables would be a square such as the shaded area in Fig. 2. However, to use this shaded area as the in-control area for our simultaneous control chart would be deviating from our original intent of constructing a chart to give 95-per cent confidence in the control limits.

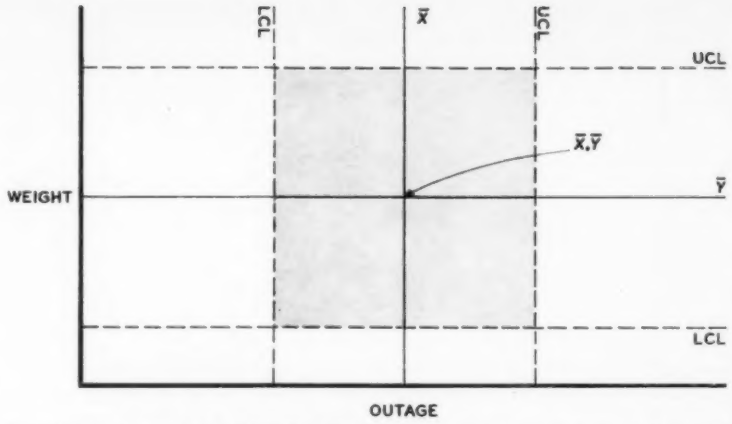
Actually, if the square area described above had been used, the confidence would have been only 90 per cent. This is easily seen if we consider that the probability of an outage value falling between the two standard-deviation limits on the outage control chart is 95 per cent, and the probability for a weight value to fall between the two standard-deviation limits on its chart is also 95 per cent. However, the *joint* probability for both to fall within limits is 0.95×0.95, or 90 per cent. Therefore, we must enlarge the shaded area to accurately represent the desired 95-per cent confidence.

Chart Must Be Circular

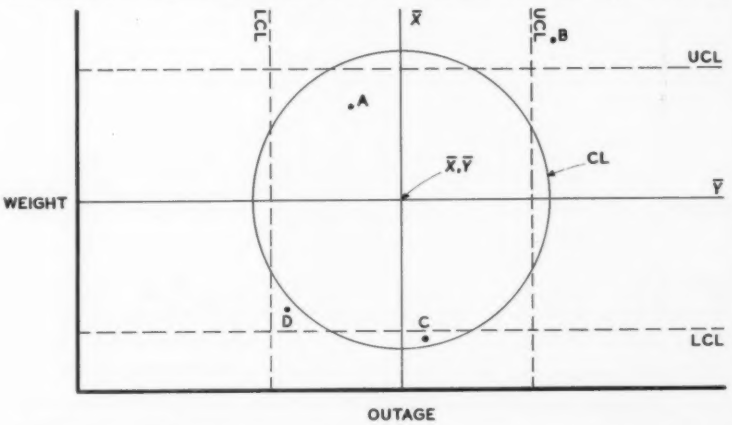
At first, it would seem that the thing to do is to make a larger square, but reference to Fig. 3 shows that, rather than a square, the shape of our simultaneous chart will be that of a circular figure. To better appreciate this shape of the control limit on the simultaneous chart, let us review briefly the single-variable (straight-line) control chart.

On single-variable charts (see Fig. 1), note that the upper and lower control limits (UCL and LCL) are a constant (calculated function of the standard deviation) distance from the mean ($\overline{X}$ or $\overline{Y}$). The mean itself is represented by a straight line, and the limits are straight lines accordingly.

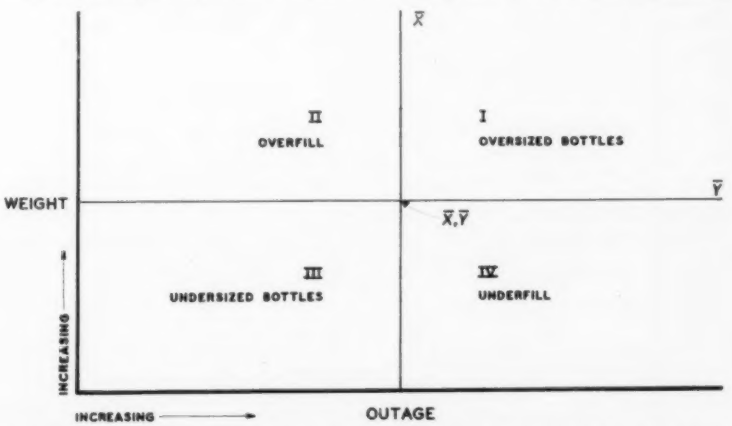
Superimposing a second single-variable chart on the first, as in Fig. 2, note that the desired mean for the combined charts now becomes a point ($\overline{X},\overline{Y}$) located at the junction of the two means. However, as in the case of the single-variable chart, the control limit remains a *constant value* from the mean. Obviously, a circular figure



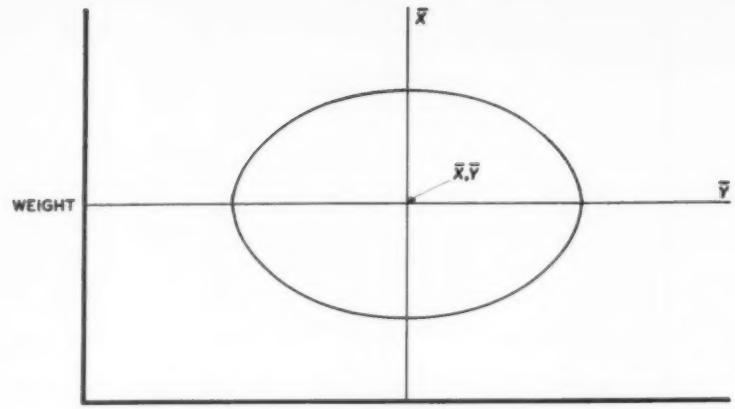
2 ROTATING OUTAGE CONTROL CHART 90° and superimposing it on weight control chart (in Fig. 1), results in this two-dimensional chart with combined mean at Point $\overline{X},\overline{Y}$. Filling is considered in control *only* when plot is within shaded square area which appears to be simultaneous control chart. *But*, this area gives only 90-per cent confidence—less than desired.



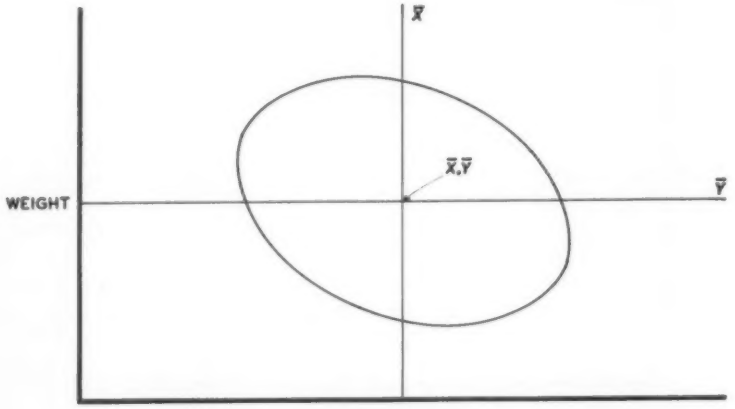
3 CIRCLE IS SHAPE of simultaneous control chart, since, as in single charts, limit (CL) is *constant value* from mean ($\overline{X},\overline{Y}$); also, circle gives 95-per cent confidence, shows true picture—square would not because: Although Points A and B would show correct in- and out-of-control respectively, C and D would be erroneously out-of- and in-control respectively.



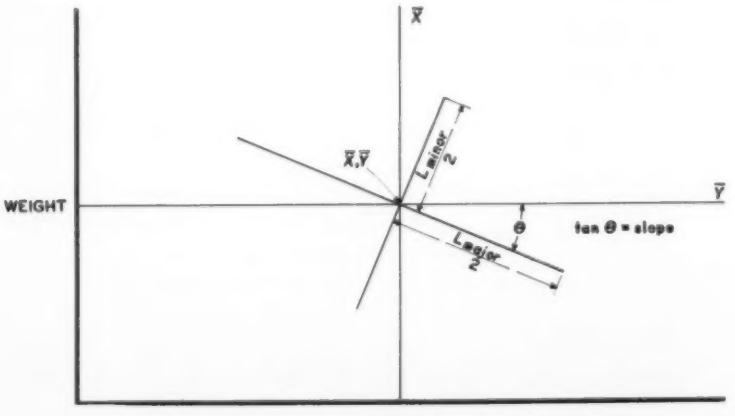
4 QUADRANTS ARE FORMED in chart by lines representing weight and outage means. Plots in Quadrant I show high outage (low fill), high weight, thus oversized bottles; in Quadrant III, low outage and low weight mean undersized bottles; in Quadrant II, low outage and high weight show overfilling; in Quadrant IV, high outage and low weight mean underfilling.



5 SHAPE OF SIMULTANEOUS CONTROL CHART is elliptical when variances of two interrelated variables (weight, outage) are *unequal*—it is circle *only* when (1) weight and outage have equal variances, (2) correlation (Fig. 6) does not exist between weight, outage.



6 CORRELATING TWO VARIABLES causes ellipse to become rotated. Higher degree of correlation, narrower and further rotated ellipse becomes, until, in case of *absolute* correlation, it becomes rotated 90° and its minor axis decreases to zero, resulting in straight line.



7 BASIC STRUCTURE of control ellipse is plotted after determining lengths and point of insection of major and minor axis, and slope of major axis. After finding coordinate values of points on curve, they are plotted and joined by continuous line to complete chart (Fig. 8).

results, with an area representing the desired 95-per cent confidence limits, as shown in Fig. 3.

Shows Real Control Picture

This type of control chart is not only simpler to maintain than two separate charts, but also results in a considerably more indicative representation of "in-control" and "out-of-control" plots as described below:

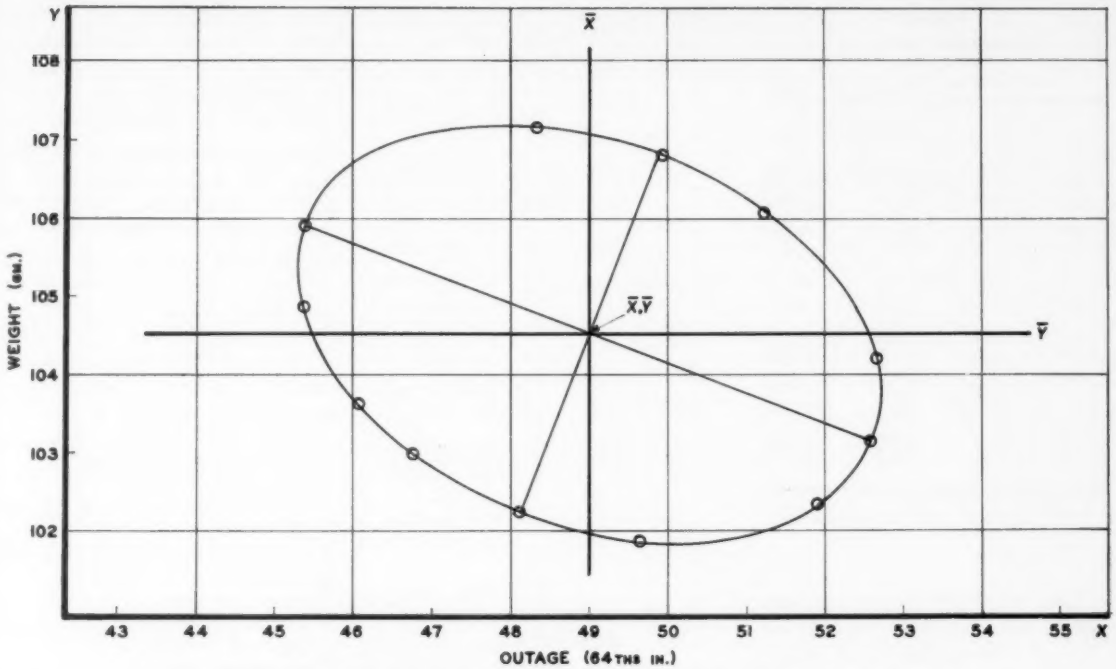
Referring to Fig. 3, if we used the square area for control, Point A would correctly represent the filling operation to be in control, while Point B would correctly represent an out-of-control condition. However, Point C would erroneously indicate an out-of-control situation, while Point D would erroneously indicate an in-control situation. Point C is then seen to be in an area of overcontrol, and Point D in an area of undercontrol.

What Quadrants Show

Now let us consider just what the simultaneous control chart offers that individual charts do not reveal to the packaging department. In Fig. 3, we use the lines representing the weight and outage means to divide the chart into four quadrants. These quadrants are shown in Fig. 4.

In Quadrant I, where the *outage is high* (low fill) and the *weight is also high*, we have a condition of *oversized bottles*. In other words, the basic reason for any point in this quadrant failing to be at the desired mean weight and mean outage is that the bottles are too large, since, although the net weight is too great, the fill point is still too low (high outage). Continuing, plotted points in Quadrant III represent a situation of *undersized bottles*.

In Quadrant II, where the *outage is below* its mean and the *weight is above* its mean, we can see that *overfilling* at the packaging line is the basic reason for the plot's departure from the intersection of both mean lines; plots in Quadrant IV are due to *underfilling*.



8 SIMULTANEOUS CONTROL CHART for two interrelated variables—outage and net weight—is elliptical because variances of these variables are *not* equal; also, variables *are correlated* causing certain slope of ellipse. Control ellipse gives clear picture of filling operation, but sacrifices convenience of time axis. This can be remedied, in part, by consecutive numbering of plotted points on chart.

When the control limit is plotted on the coordinate axes for weight and outage, we then have a complete tool for control. As we have demonstrated earlier, any point within the limit is considered to be "in control," while a plot outside the limit represents an "out-of-control" situation. Moreover, the basic reason for any point being out of control is determined by whatever quadrant in which it happens to occur, as explained in the previous section.

Chart Changes To Ellipse

At this point, it is important to emphasize that the simultaneous control chart will be circular in form *only* when the following conditions exist:

1. When the weight and outage have equal variances;
2. When no correlation exists between weight and outage.

The simultaneous control chart changes shape from the circle described above to an ellipse as shown in Fig. 5, when the variances of the two variables are not equal, which is most often the case. Moreover, if the two variables are correlated *(3)*, the ellipse becomes rotated as in Fig. 6. The higher the degree of correlation, the narrower and further rotated the ellipse becomes, until, for the case of *absolute* correlation of the variables, the ellipse becomes rotated 90° and its minor axis decreases to 0 so that a straight line results.

Has No Time Axis

In summary, the control chart for simultaneous control of two variables offers an accurate and significant picture of the situation affected by them. Errors of over- and undercontrol are eliminated. The basic reason for any plot deviating from the point of joint means is indicated by the particular quadrant in which it falls. Correction for out-of-control points is clearly indicated.

The control ellipse, in giving this clear, pictorial view of the operation, sacrifices the convenience of a time axis. This can be remedied, in part, by a consecutive numbering of the plotted points on the chart.

CALCULATE CONTROL ELLIPSE

To illustrate the application of the simultaneous control chart, we have selected a bottle filling operation. The two variables to be controlled are net weight, Y, measured in grams, and outage, X, measured in sixty-fourths of an inch. A total of 184 measurements, N, of each was taken to develop the chart.

Basic Data

The basic calculations necessary for the determination of the ellipse are as follows:

Outage = X	Weight = Y
$\Sigma X = 1{,}653$	$\Sigma Y = 828.9$
$\Sigma X^2 = 15{,}257$	$\Sigma Y^2 = 3{,}947.09$
$N = 184$	$N = 184$

$$\Sigma XY = 7{,}359.50$$

(Turn page)

TABLE

Coordinates* Of Points For Plotting Simultaneous Control Chart

		Coordinates*	
g	*h*	*x*	*y*
1.000	2.257	51.227	106.041
1.000	−2.257	49.639	101.865
−1.000	2.257	48.329	107.145
−1.000	−2.257	46.741	102.969
2.257	1.000	52.606	104.184
−2.257	1.000	46.066	103.611
2.257	−1.000	51.902	102.334
−2.257	−1.000	45.362	104.826
0	2.468	49.853	106.788
0	−2.468	48.115	102.222
2.468	0	52.560	103.143
−2.468	0	45.408	105.867

*x = outage, y = net weight, of bottled liquid product; coordinates calculated by Equations 15 and 16 (see text), using corresponding values of g and h.

The individual values of both weight and outage were coded for ease of calculation. This coding affects only the calculation of the means, insofar as adjustments must be made to the mean values calculated from the above data. In particular, the value 40 was subtracted from each of the raw outage measurements and 100 was subtracted from each of the weight measurements. These values must be added after completion of calculation of the means.

We are now ready to make the calculations below, using the basic data to solve the equations:

Outage mean

$$\bar{X} = \frac{\Sigma X}{N} + 40 .$$

Solution:

$$\bar{X} = \frac{1653}{184} + 40$$

$$= 48.984 \quad \text{64ths in.} \quad (1)$$

Net weight mean

$$\bar{Y} = \frac{\Sigma Y}{N} + 100 .$$

Solution:

$$\bar{Y} = \frac{828.9}{184} + 100$$

$$= 104.505 \text{ gm.} \quad (2)$$

Outage variance

$$S_x^2 = \frac{N\Sigma X^2 - (\Sigma X)^2}{N(N-1)} .$$

Solution:

$$S_x^2 = \frac{184 \cdot 15257 - (1653)^2}{184 \cdot 183}$$

$$= 2.223 . \quad (3)$$

Net weight variance

$$S_y^2 = \frac{N\Sigma Y^2 - (\Sigma Y)^2}{N(N-1)} .$$

Solution:

$$S_y^2 = \frac{184 \cdot 3947.09 - (828.9)^2}{184 \cdot 183}$$

$$= 1.163 . \quad (4)$$

Covariance

$$S_{xy} = \frac{N\Sigma XY - \Sigma X \Sigma Y}{N(N-1)} .$$

Solution:

$$S_{xy} = \frac{184 \cdot 7359.50 - 1653 \cdot 828.9}{184 \cdot 183}$$

$$= -0.475 . \quad (5)$$

Sample correlation coefficient

$$r = \frac{S_{xy}}{S_x S_y} .$$

Solution:

$$r = \frac{-0.475}{1.491 \cdot 1.078}$$

$$= -0.295 \quad (6)$$

where the value of S_{xy} is from Equation 5, and S_x and S_y are the square roots of the values in Equations 3 and 4 respectively.

A sample correlation coefficient of $r = -0.295$ (Equation 6) indicates that a moderate degree of *negative* correlation exists between the variables. In other words, as one variable increases, the other variable tends to decrease. If we had chosen to measure bottle innage rather than outage, then the innage would have increased as the weight increased, resulting in a positive value of *r*.

Determine Statistic T^2

The next step in the calculation of the chart is the determination of the statistic T^2 *(1, 5)*. We use the equation

$$T^2 = \frac{2(N-1)F_a}{N-2} .$$

where $Fa = F_{0.05} = 3.03$, as determined from the *F* tables with $n_1 = 2$ and $n_2 = 182$ (*N*–2) at 95-per cent confidence. [Values for *F* can be found from tables at the back of most statistics texts *(4)*.]

Solving for T^2, we have

$$T^2 = \frac{2 \cdot 183 \cdot 3.03}{182}$$

$$= 6.093 . \quad (7)$$

Find Lengths Of Axes

To calculate the lengths of the major and minor axes of the control

Walter L. Heilman is a graduate of Drexel Institute of Technology with a B.S. in industrial engineering. He has done postgraduate work at Xavier University and is presently working toward an M.S. in mathematics at University of Cincinnati. During most of his tour of duty in the U.S. Army, he taught internal missile guidance component systems at Redstone Arsenal, Alabama. At Procter & Gamble, Mr. Heilman was engaged in time study and cost control prior to his current work in statistics.

Eugene U. Mariani was graduated from St. Louis University with a B.S. in industrial engineering, and has done additional work in mathematics and mechanical engineering at Xavier University and Washington University. Since joining Procter & Gamble, he has worked on wage cost control and is now plant methods engineer. Mr. Mariani is a registered professional engineer and a member of Engineering Society of Cincinnati.

ellipse, we must first determine λ_1 and λ_2 *(1)*, which are the roots of the equation

$$\lambda^2 - (S_x^2 + S_y^2)\lambda + [S_x^2 S_y^2 - (S_{xy})^2] = 0.$$

This can be otherwise represented by the general equation

$$a\lambda^2 + b\lambda + c = 0$$

where $a = 1$, $b = -(S_x^2 + S_y^2)$, and $c = S_x^2 S_y^2 - (S_{xy})^2$. Solving by quadratic formula gives us

$$\lambda = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Substituting the values of a, b, and c, we have specifically

$$\lambda = \frac{-[-(S_x^2 + S_y^2)] \pm \sqrt{[-(S_x^2 + S_y^2)]^2 - 4[S_x^2 S_y^2 - (S_{xy})^2]}}{2}.$$

Using the values from Equations 3, 4, and 5, to solve the above equation, shows that

$$\lambda_1 = 2.404 \qquad (8)$$

and

$$\lambda_2 = 0.981 \qquad (9)$$

for our example. We can now find the lengths of the axes.

The length of the major axis, $L_{(major)}$, is determined by the expression

$$L_{(major)} = 2\sqrt{\lambda_1} T^2$$

and using the values from Equations 8 and 7, we find

$$L_{(major)} = 7.654. \qquad (10)$$

For the length of the minor axis, $L_{(minor)}$, the expression is

$$L_{(minor)} = 2\sqrt{\lambda_2} T^2$$

and using the values from Equations 9 and 7, we have

$$L_{(minor)} = 4.889. \qquad (11)$$

Slope Of Ellipse

We must now determine the slope of the ellipse. The slope of the major axis is represented by the symbol b and is determined by the equation

$$b = \frac{\lambda_1 - S_x^2}{S_{xy}}.$$

Using the values from Equations 8, 3, and 5, we can solve this equation as follows:

$$b = \frac{2.404 - 2.223}{-0.475}$$

$$= -0.381. \qquad (12)$$

PLOT ELLIPSE

Basically, we have arrived at all of the information we need to construct our control chart. We have determined the following data:

1. Lengths of major and minor axes (Equations 10 and 11);
2. Slope of the major axis (Equation 12);
3. Point of intersection of the axes (Equations 1 and 2).

With this, we can now plot the diagram as shown in Fig. 7.

Find Coordinates Of Points

Utilizing this diagram and drawing upon a knowledge of the basic equation for an ellipse, it is possible to construct the completed chart. However, the following method is generally preferred for determining the coordinates of the points on the curve. Once the coordinate values are determined, the points can be plotted, joined by a continuous line, and the chart is completed.

To determine the coordinates of the points on the ellipse, we must first determine the following:

$$V_{1x} = \sqrt{\frac{\lambda_1}{b^2 + 1}} = 1.449$$

$$V_{1y} = bV_{1x} = -0.552$$

$$V_{2y} = \sqrt{\frac{\lambda_2}{b^2 + 1}} = 0.925$$

$$V_{2x} = -bV_{2y} = 0.352.$$

Values used to calculate the above are found in Equations 8, 12, and 9.

The next step is based upon the relationship

$$g^2 + h^2 = T^2.$$

From this we see that

$$g = \pm\sqrt{T^2 - h^2} \qquad (13)$$

and

$$h = \pm\sqrt{T^2 - g^2}. \qquad (14)$$

By assuming various values of g and h, we can construct half of the table which accompanies this article. For example, in Equation 14, if we assume $g = +1$, then

$$h = \pm\sqrt{6.093 - (1)^2}$$

$$= \pm 2.257;$$

also, if we let $g = -1$, then

$$h = \pm\sqrt{6.093 - (-1)^2}$$

$$= \pm 2.257.$$

Similarly, using Equation 13 and letting $h = +1$, we find that

$$g = \pm 2.257;$$

and if $h = -1$,

$$g = \pm 2.257.$$

We can now readily calculate the coordinate values by substituting these calculated values of g and h in the expressions

$$x = \overline{X} + gV_{1x} + hV_{2x} \qquad (15)$$

and

$$y = \overline{Y} + gV_{1y} + hV_{2y}, \qquad (16)$$

thereby completing our table.

Plotting the x and y values, and joining the plots with a continuous line, results in the completed simultaneous control chart as shown in Fig. 8.

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Gentle handling of "fragile" two-pound fruitcakes on semi-automatic packaging line permits speed of up to 54 cakes per minute, with under 0.1 per cent damage.

1 MODIFIED PISTON FILLER deposits cake batter into pan containing paper liner. Change includes turntable (T) whose center is slightly eccentric to filling head center. Thus, nozzle feeds into pan's circular trough while turntable rotates pan. (Arrow shows travel direction.)

Packaging techniques reduce on-line product damage

By Larry N. Gordon,
Production Superintendent, Cakemasters of America, Chicago

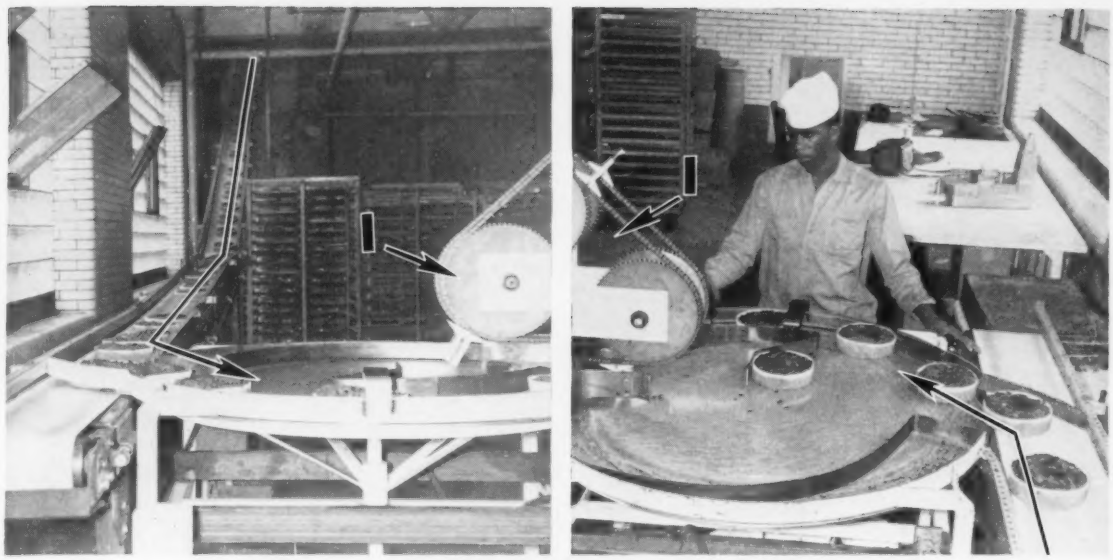
Fast, efficient packaging of a delicate product may seem troublesome until you work out just the right handling techniques. Faced with this problem in packaging its fruitcakes, Cakemasters developed a semi-automatic line to provide gentle handling from start to finish. Pointing out that some of the equipment was built by the company's engineers, Mr. Gordon describes the complete operation, including details of the company-built machinery.

Working out techniques of high-speed packaging for a fairly fragile product has allowed us to reduce damage and has given us a good rate of production. In our twenty-five years' experience of baking and packaging fruitcakes, we have developed a semi-automatic line on which the cakes are wrapped in cellophane and packaged in a two-piece metal container with less than 0.1 per cent breakage.

Make Only One Product

Our only product is fruitcake. Approximately 95 per cent of our production is the 2-lb. size (7-in. diameter and 2¾-in. height), and the remaining 5 per cent includes 5-lb. and other sizes.

We start our annual bake each May, and continue baking through the peak of our season in December. At our present rate of 21,500 fruitcakes per 8-hr. day, we pre-



2 SMOOTH, EVEN MOVEMENT of cakes depends on large turntable which transfers them from conveyor belt leading from second floor (left photo) to automatic infeed device (I) for overwrap machine. Designed by Cakemasters, turntable has spring-steel guides (right photo) to insure even flow of cakes to wrapping machine. (Bent arrows show travel direction.)

pare and package more than two million cakes by Christmas.

Production starts with our modified Elgin single-head piston fillers which fill our round cake pans with batter. The cake pans have a center tube which serves two purposes. First, with the center tube we can obtain an even bake all the way through the cake in less time than if the batter were put in the pan in a solid mass. Second, it is traditional to have fruitcakes with a hole in the middle—that is, donut-shaped cakes.

How Filler Is Modified

Using center-tube pans required that we modify our piston fillers to simplify the filling operation. We designed and built a turntable mounted about 5 in. below the filler spout. The center of the circular turntable is mounted slightly eccentric to the center of the filling nozzle (see Fig. 1). Thus, as the table rotates, with a pan on it, the nozzle feeds into the pan's circular trough.

Fills Pans

Before filling the pans with batter, a girl places a fluted, cup-shaped, bleached-kraft paper liner into each pan to aid in removing the cake after baking. She then places the pan on the turntable which rotates 375° for each deposit. The filler deposits 2 lb. of batter into the pan.

Even though the batter is a heavy, viscous, semi-liquid with chunks of fruit glacé in it, we have had considerable success in filling the pans uniformly because the turntable allows us to deposit the batter evenly around the pan.

After the pans are filled, a girl places fruit glacé on top of the batter for decoration, after which the cakes move to the baking oven.

After baking, the cakes move on wheeled storage racks to an air-cooled and dehumidified holding room where they cool for 24 hr. under germicidal lamps before removal from the pans. This cooling period helps reduce damage. Cakes fresh from the oven are very soft, and break easily if taken from their pans while hot.

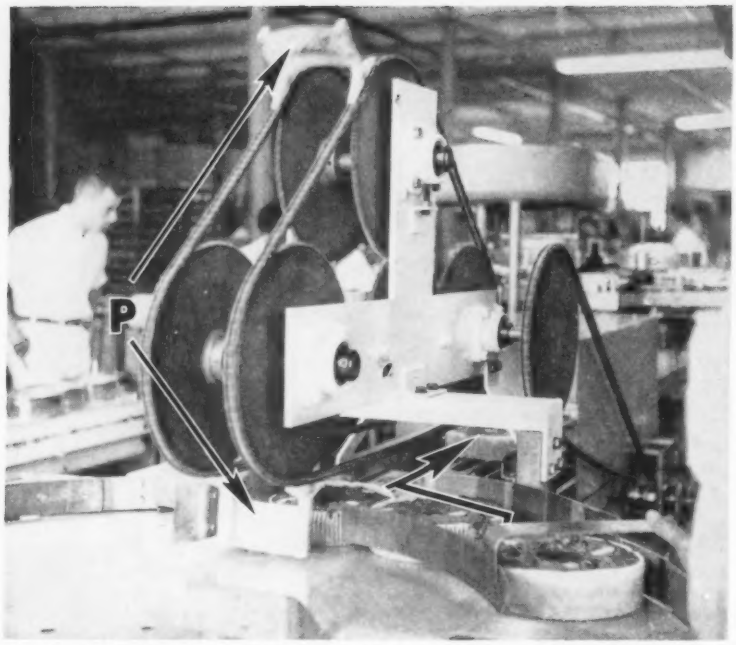
Next day when the cakes are cool, attendants push the racks in the holding room to a powered conveyor belt where the cakes are removed from the pans by hand and placed on the conveyor. Then they move to a station where a girl checkweighs them. Cakes of correct weight and any overweights move along to the packaging lines. Underweight cakes are diverted.

For the 2-lb. size, we overfill the pan with ½ to 1 oz. of batter because the cakes lose some moisture in baking. With an accurate fill, we have little variation in net weight after baking. We end up with very few underweight cakes.

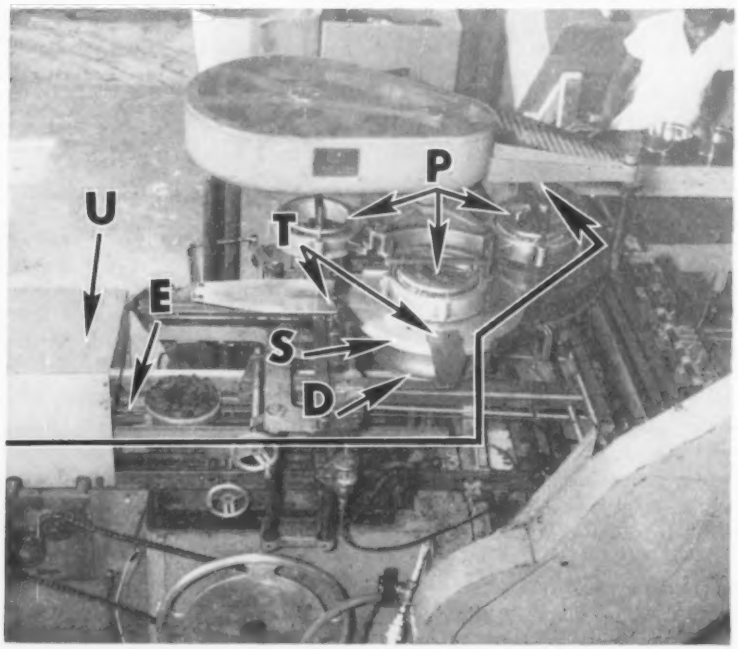
The Packaging Line

After checkweighing, the cakes move along a powered belt conveyor from the second floor where they are baked, to the first floor where they are packaged. At the end of this conveyor, we have a turntable which we designed (and which Velten and Pulver built). We added spring-steel guides to the turntable (see Fig. 2) to insure an even flow of cakes to the wrapping machine.

The turntable does not function as an unscrambler, but merely acts as a transfer from one conveyor to another—to the infeed conveyor of the wrapping machine. We use this method of transfer to get a smooth, even movement of cakes—thus damage to cakes is held down at this transfer point. *(Turn page)*



3 **AUTOMATIC INFEED DEVICE,** powered by, and synchronized with, wrapping machine, consists of three pairs of sprocket wheels on which two endless chains ride. As one of three pushers (P), mounted on chains equidistantly, moves down in back of cake, it pushes cakes from table to wrapping machine, assuring smooth transfer. (Bent arrow shows travel direction.)



4 **CAKES ENTER WRAPPING MACHINE** at Point E as they emerge from ultraviolet lamp (U). As cake enters upon elevator (not visible), cellophane feeds into machine from opposite end, is positioned between cake and die-bushing (D). Elevator carries cake upward, picks up cellophane, and carries both through die-bushing into waiting pocket (P). Tuckers (T) fold wrapper under cake. Pocket wheel then moves partially wrapped cake off elevator, and platform (S) around die-bushing wipes fourth fold in "bunch" fold. At 51 to 54 cakes/min., wrapper is sealed at 600°F. with dwell time of approximately 1 sec. (Bent arrow shows travel direction.)

Build Own Infeed Device

As the cakes move around the turntable, they are positioned under an automatic infeed device (see Fig. 3), which Harold Benson, our maintenance engineer, designed and built. An operator stationed at the turntable makes sure the cakes are positioned properly on it, so they are not jammed and broken in the automatic infeed. This device consists of three pairs of sprocket wheels, on which two endless chains ride. Three pusher blades, spaced equidistantly, are mounted on the chains.

As a pusher moves down in back of a cake, it pushes the cake from the turntable to the wrapping equipment. This device is powered by the wrapping machine; thus it is synchronized with the infeed of the wrapper. With this device, we get a smooth transfer of cakes from the turntable to the wrapper infeed, keeping cake damage down.

The cakes move under an ultraviolet germicidal lamp just before reaching the wrapping equipment.

Wrapping The Cakes

The cakes are carried along by the double chain infeed conveyor of our Crompton and Knowles wrapping machine (see Fig. 4) to an elevating mechanism which carries each cake, one at a time, upward to a 4-station pocket wheel. Between this wheel and the elevator, is mounted a die-bushing which actually forms the cellophane around the cake. At the same time the cake is transferred onto the elevator, cellophane feeds into the machine from the end opposite where the cakes enter. With a wrapper cut-off of 18 in., a single sheet of cellophane is positioned between the die-bushing and the cake below.

As the cake is carried upward, it pushes against the cellophane, and both are pushed through the die-bushing and into the waiting pocket of the pocket wheel. Two side tuckers and a back folder fold the wrapper under the cake. The pocket wheel then moves the par-

tially wrapped cake off the elevator, and the platform around the die-bushing wipes the fourth fold as the cake travels away in a circular motion to the sealing station (see Fig. 4).

Operating at speeds of 51 to 54 cakes/min., the wrapper is sealed at 600°F. With a dwell time of about 1 sec. (54 cakes/min.), it is necessary to use this high a temperature because of the several layers of cellophane created by the "bunch" fold. At slower speeds, e.g., below 50 cakes/min., we seal at a temperature as low as 475°F.

We use 300 MS-10 cellophane in roll-stock form, 15 in. wide. Mounted on 3-in. cores, the outside roll diameter is 13 in. We went from a 9-in. diameter roll to a 13-in. to reduce downtime—the larger diameter roll lasts about twice as long.

From the sealing plate, the cakes are indexed to a lowering platform and onto a two-belt discharge conveyor. Each belt is ¼x½ in. and rides above supporting rollers. Spaced about 4 in. apart, the belts hold the cakes up from the conveyor mechanism, to allow air, circulating under the wrapped cakes, to cool and set the heat seal (see Fig. 5).

Wrapped cakes discharge from the wrapping machine onto a powered belt conveyor which carries them to where they are indexed into the two-piece metal containers.

Put Cakes Into Cans

We designed and built an indexing device (see Fig. 6) into which a girl feeds the lower half of the metal container. She places the can bottom onto a powered conveyor belt, and the container indexes automatically under the conveyor carrying the cake. When the two are indexed properly, the cake slides into the lower half of the container, which continues to move along the belt conveyor. One girl supplies can bottoms to the girl who is feeding them to the line, and the two girls change jobs periodically.

As the cakes move along the conveyor, three girls place "hang-

Larry N. Gordon received a B.A. in chemistry from Illinois Institute of Technology and is also a graduate of American Institute of Baking. After two years in the bakery equipment section of the U.S. Army Quartermaster Research and Engineering Command, Mr. Gordon joined Cakemasters where he has been production superintendent for three years. A member of American Society of Bakery Engineers, he recently returned from England as a participant of ASBE's Anglo-American student exchange program.

out" labels over the cake and over the side of the can bottom. Then they place the slip cover on the container (see Fig. 7). A fourth girl supplies covers and labels to the three who close the containers.

The part of the label that hangs out of the can provides an identifying tag for the finished package indicating that there is a fruitcake inside the metal container which has no identifying marks on it.

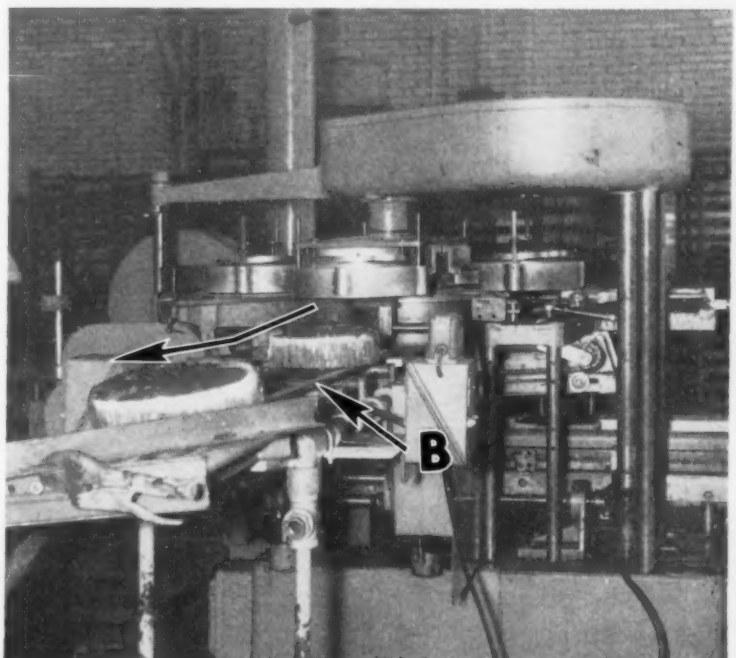
Three other girls then put the filled containers into 275-lb.-test, A-flute corrugated shipping cases (see Fig. 8). Twelve cakes are packed per case—three layers of four cakes, with a paper liner between layers.

The filled shipper then moves through our A-B-C case sealer to a palletizing station where they are stacked on pallets ready for shipment. The man who palletizes the filled shipping cases supplies knocked down cases to the three girls who fill them.

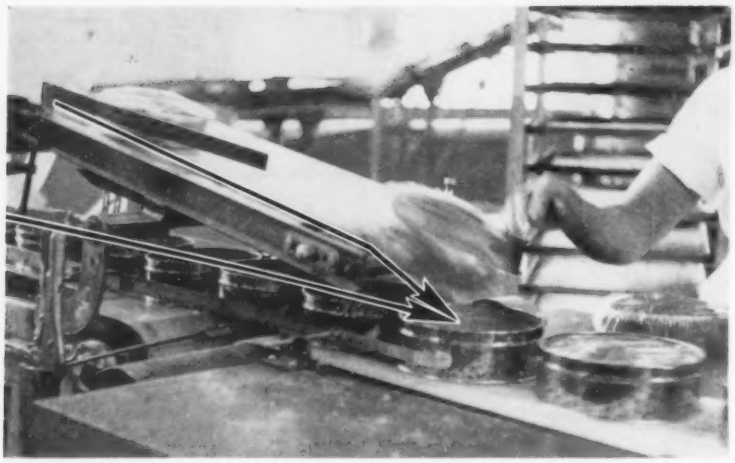
Damage Reduction

We owe much of our success in marketing fruitcakes to the gentle handling techniques we have developed in our packaging operation. Also, cooling the cakes before packaging lowers the damage rate because the cakes are not as soft and delicate as they are upon emerging from our ovens.

We have an air hose, with a home-made nozzle, attached to our



5 **INDEXED TO LOWERING PLATFORM,** cakes transfer to two-belt discharge conveyor. Each ½ ×½-in. belt (B) rides on rollers. Spaced about 4 in. apart, belts support cakes to let air, circulating under cakes, cool and set heat seal. (Bent arrow shows travel direction.)



6 **COMPANY-BUILT DEVICE** automatically indexes cakes to cans. With cans on lower belt, cakes on upper one slide into cans at junction of belts. (Arrows show travel direction.)

7 **LABELING AND CLOSING CANS** consists of placing "hang-out" labels over cake and side of can which has no identifying marks on it, and putting slip cover on container.

8 **FINISHED PACKAGES** are packed in 275-lb.-test, A-flute corrugated shippers, 12 cakes/case (4 cakes/layer, 3 layers high with paper liner between). Cases then move to case sealer.

wrapping machine, and we use this to keep our packaging lines clean. As the cakes move along the line to the wrapping machine, a few small pieces of fruit glacé fall from the cakes. If we did not keep the lines constantly free of this fruit, it would cause the cakes to drag in the equipment, and damage would increase.

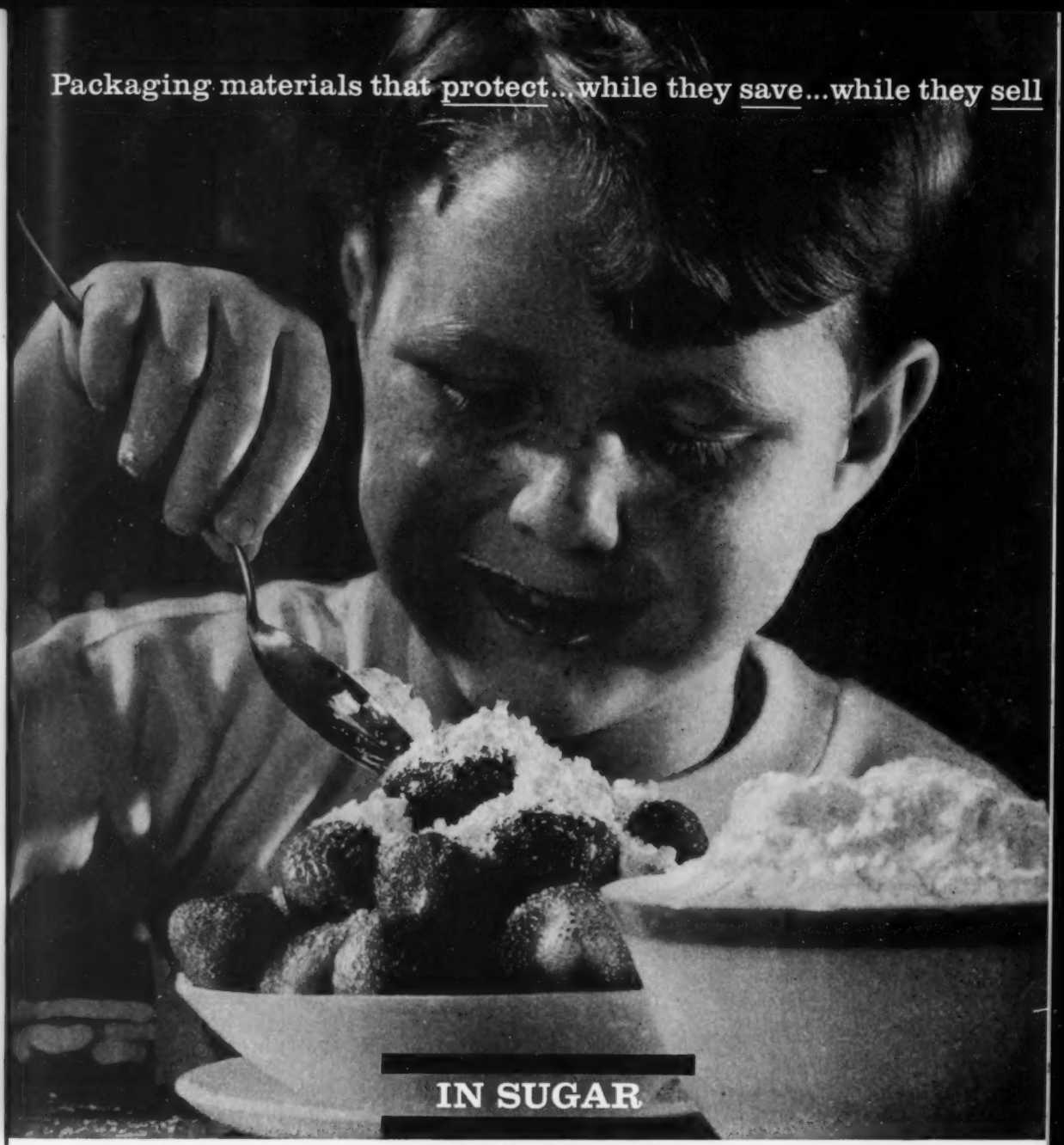
The nozzle on the air line is made of two pieces of electrical conduit hooked to an ordinary water valve. The open end of the nozzle has been pinched together, and the fine stream of air pressure blows the fruit out of the conveyor infeed.

We plan to Teflon-coat the turntable which transfers the cakes to the automatic infeed device. This will further reduce our damage rate, which is now less than 25 broken cakes in an 8-hr. day. This coating will reduce drag on the bottom of the cakes, and will improve handling at this critical point.

Plan Synchronized Line

We plan to synchronize our whole line so we can de-pan and checkweigh cakes at the same speed that we package them. With our present set-up of de-panning and checkweighing, the cakes may back up at the wrapping machinery, and break one another. With line synchronization, cakes will not back up, and damage will be eliminated at this point.

To avoid shutting down the entire line to change cellophane rolls on the wrapping machine, we plan to install a delaying or "storage" conveyor. The cakes will be diverted to this conveyor when we change rolls. It will take four minutes to fill the conveyor, and we can change rolls while it is filling up. When the roll is changed, cakes will be fed directly from the "storage conveyor" to the wrapping machine. Thus, we will be able to de-pan and checkweigh cakes continuously without shutting down the whole line, and without having a line of cakes backing up while we change rolls. *(End)*



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PREDICT STACKING STRENGTH OF CORRUGATED BOXES ACCURATELY

Get what you WANT boxes to do, predict what they WILL do—use column-crush test

By A. H. McKinlay,
Packaging Engineer,
Packaging Laboratory, Manufacturing Services,
General Electric Company, Schenectady

Most people who use corrugated boxes at one time or another have the problem of stacking them in the warehouse. Even an educated guess as to the correct type of board needed for a job may be very unsatisfactory with stacked boxes falling and damaging merchandise or injuring people.

Need For Spec's On Strength

We saw the need for indicating on our company's purchase orders for corrugated board used in the fabrication of boxes, specifications which would pinpoint minimum expected stacking strength. We concluded that, as a first step in this direction, we would approach the solution to this problem by using in our specifications a modified column-crush test on combined board. By modified, we mean that we reduced the size of sample tested from the original size, 1 in. high, to ¾ in. high. (See test method on Page 68).

In this way, we were assured that the failure incurred would always be of the crushing type instead of buckling failure due to a glue skip. Thus, we would not only have a way to keep box quality up, but by using the crush-test values (see table) in conjunction with the Forest Products Laboratory's box strength calculator *(7)*, designers would be able to accurately predict the grade of board needed to do a specific job in the warehouse.

Find Good Correlation

We verified our conclusions by having 24 of the GE plants which use the greatest amount of corrugated board send 175 boxes of different dimensions, flutes, and tests to our central packaging laboratory. Here, we ran compression tests and column-crush tests on the samples. These 175 boxes were manufactured by 47 different companies representing both large integrated corporations and small privately owned concerns.

The column-crush strength results were placed in the box strength calculator and its predicted reading checked against the actual compression load. In fact,

Correct stacking strength in corrugated boxes can reduce accidents and the amount of damaged merchandise in warehouses. Mr. McKinlay tells why General Electric uses its own modification of the test (see Page 68) and specifies on its orders that board used for a given box must meet certain column-crush values. By using these values in the box strength calculator, the company can predict the grade of board needed for a specific job.

the correlation was so good that it encouraged us to proceed with a plan to include column-crush strength in our new corrugated board specification.

Checked Out Proposed Crush Test

Our procedure to check out the proposed crush test was as follows:

First, compression test the entire box in a National Forge 10,000-lb. compression machine;

Second, column-crush test a sample piece of the same box in an H & D crush tester;

Third, record the flute, dimensions, and test stamp on the box.

Then, as a check on the correlation of the column-crush test to compression load, the crush values obtained were used in the box strength calculator to arrive at predicted machine compression load. This was compared to the actual load obtained.

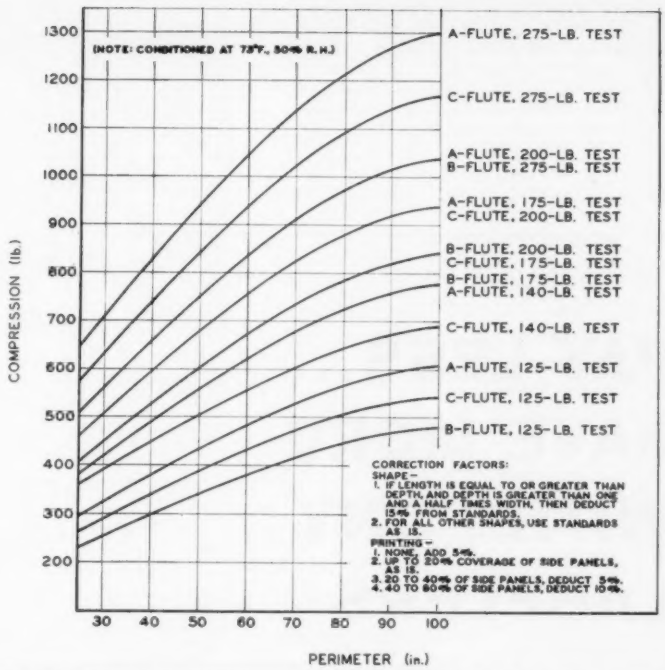
It was surprising to see how closely the two generally agreed. For instance, one 275-lb. test, A-flute box, inside dimensions 7½x 7½x13 in., was predicted to go 1,060 lb. and actually tested 1,000 lb. Another box, a 350-lb. test, A-flute box measuring 30x22x18 in., was predicted to load to 2,150 lb. and actually failed at 2,250 lb.

This is generally the type of agreement found, except where variations in scoring between manufacturers caused the predications to deviate somewhat. But since scoring of boxes is a thesis in itself, we won't consider that subject here.

Relate "Crush" To "Burst"

With this sort of agreement we are well satisfied that the column-crush test is the first good board test we have for pinpointing box compression strength. Since the common practice in specifying grade of board desired is by burst strength (a poor way, but the accepted way), the next step necessary is to relate crush strength of board to burst test stamped on the box. This has been done and is shown in the table. Note that values of crush listed are minimum, not average.

It has been our experience a number of times, since adopting this test, that the only way we could uncover a reason for one vendor's box outperforming another's in compression was by the simple column-crush evaluation. This stems from the fact that one vendor's board stamped 275-lb. test will crush at 37 lb./in., while another's stamped also 275-lb. test will go 65 lb./in. If you are troubled with stacking problems, don't rely on a burst test only to determine what you want in board strength. Get to the root of the problem and specify column crush.



1 TOP-TO-BOTTOM COMPRESSION TEST STANDARDS. Graph simplifies problem of predicting top-to-bottom stacking strengths, but is not always accurate for all compression strengths. It is satisfactory for its intended purpose—to take much guesswork out of box design.

Predict Strength Accurately?

A number of attempts have been made to document a procedure for accurately predicting the top-to-bottom strength of a given corrugated box. Some methods are simple to use, but only determine an approximation of results to be expected; others are more complicated, but give closer predictions of actual strengths.

One of the earlier attempts to formalize predictions of top-to-bottom stacking strengths was by Balkema (*2, 3*). Essentially, his method consisted of plotting a series of curves for different tests of board with axes of pounds of compression versus inches of box perimeter (Fig. 1). Correction factors for shape and printing were also included. Although this graph simplifies a complicated problem, it will not always closely predict all compression strengths. However, this approach is satisfactory for the purpose for which it was intended—to take much of the guesswork out of designing boxes.

Another report which reduces this complicated problem to a simple solution was by Gaylord Container Div., Crown Zellerbach Corp. (*4*). It also presents a graphical solution (Fig. 2), plotting curves of box perimeter on axes of pounds of compression load versus inches of box depth. These compression results are then modified by a flute factor and a box test factor. Essentially, this graphic solution is the same as Balkema's except for factoring in the additional variable of box depth. This additional factor makes the computation more difficult but closer to actual results. *(Turn page)*

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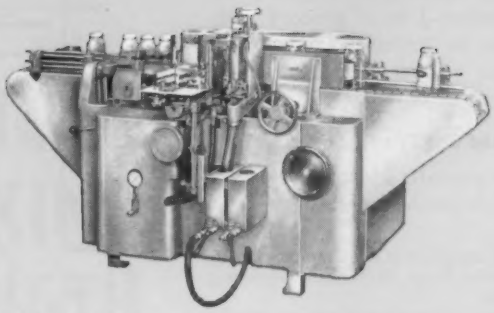
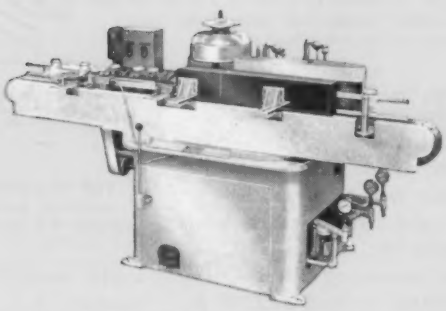


PONY 75: Speed up to 75/min
Label Range: 4½" wide x 5" high, max
⅞" wide x ⅞" high, min



PONY 165: Speed up to 165/min
Label Range: 5½" wide x 5" high, max
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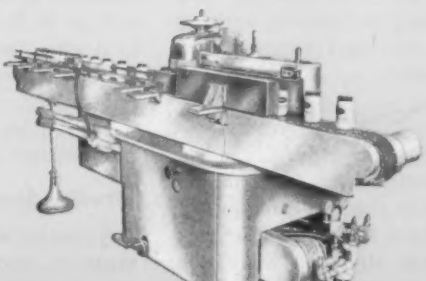

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Is There An *Average* Box?

These two methods have been based on an average or a minimum box. But what is meant by an "average" box? Can you say that an average 200-lb.-test box that burst tests at 200 lb. will indicate *average* compression strength? It will not! It is generally agreed that there is little, or no, correlation between the burst strength and the compression strength.

Does puncture strength or flat crush have a good correlation to compression strength? No, say the experts. How then, can you define this problem further if you do not have a comparative factor for board strength?

Pin Down Board Variable

Maltenfort considered the problem *(8)* and after conducting a considerable number of tests, decided his results would fit to the formulas as follows:

For A-flute:

$$S=5.8L+12W-2.1D+6.5\,\text{CLT-O}+365$$

For B-flute:

$$S=5.8L+12W-2.1D+5.4\,\text{CLT-O}+212$$

For C-flute:

$$S=5.8L+12W-2.1D+6.5\text{CLT-O}+350$$

where S is compression strength; L, W, and D are the inside length, width, and depth dimensions of the box; and CLT-O is the Concora liner test.

With the CLT-O test, we have pinned down a board variable which has a direct correlation to box compression strength. This variable is the crushing strength of the liners in the across-machine direction. In other words, by obtaining the crush test of a small sample of liner material (6x½ in.), you can more accurately predict the top-to-bottom stacking strength of all boxes made from that run of liner board than you could with the previous calculating methods.

How To Test Combined Board

However, the CLT-O test is conducted on liner board before it is combined. This presents no problem for the box manufacturer, but how do we users measure the crushing strength of the corrugated board when we receive only the combined board?

Kellicutt and Landt *(6)* have a

A. H. McKinlay was graduated from Union College, Schenectady, with a degree in industrial administration. After three years as a packaging engineer at Alco Products Inc., he joined General Electric's packaging laboratory as a packaging engineer, specializing in corrugated design and package testing. Mr. McKinlay is a member of American Society for Testing Materials and Society of Packaging and Handling Engineers.

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solution—with the column-crush test on *combined* board. Simply stated, their work is manifested in this equation:

$$S = 2.52 \times C \times a^{3/8} \times Z^{1/2} \times J \qquad (1)$$

where S is compression strength; C is the column crush; a is flute factor 8.36, 5.00, or 6.10, for A-, B-, or C-flute, respectively; Z is the perimeter of the box in inches; and J is the box factor of 0.59 for A-flute, and 0.68 for B- and C-flutes.

The column crush *(C)* in Equation 1 stands for the value obtained when a small piece of the combined corrugated board, 4 in. long by 1 in. high, is subjected to a crushing force in a small compression machine. Taking the test result and dividing it by 4, gives you the column-crush resistance of the board in pounds per inch length tested. Substituting this back in Equation 1, along with the flute and dimension variables, gives the average compression load of the box.

TABLE
Column-Crush Values

Burst Test (lb./sq. in.)	Wall Construction	Recommended Minimum Crush Values (lb./in.)
125	Single	24
140	Single	27
175	Single	32
200	Single	35
275	Single	55
300	Single	60
350	Single	70
200	Double	60
275	Double	65
350	Double	70
500	Double	90
600	Double	100
1100*	Triple	130

*Puncture test.

Control Flute Strength

As a user of corrugated boxes, you need only specify the crushing flute strength of the board as you now specify burst or flat crush, and you will have another variable in box compression strength under your control. The table shows suggested column-crush test values.

Just a word of caution here. When we mention compression strength or load, we are referring to that reading obtained when the box is tested in a compression machine at 73°F. and 50-per cent R.H. To find out how high you can stack your boxes, knowing the machine test load, you must consider, among other things, humidity and length of storage. Several studies have been made on this and their results are used on the FPL's calculator.

Kellicutt has also explored other variables in box strength, including crushing strength in his series of "notes," previously published *(5)*. He, Landt, and Setterholm have combined much of the FPL's work into the simple box strength calculator *(7)* previously mentioned. This makes prediction of box compression strength easy and accurate.

Angell and Paslay *(1)* have explored the theoretical side of box compression strength. Several of

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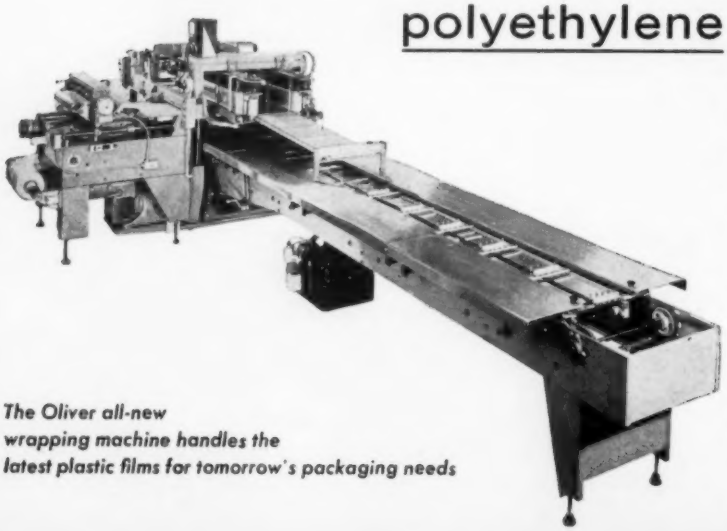

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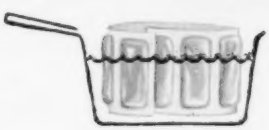

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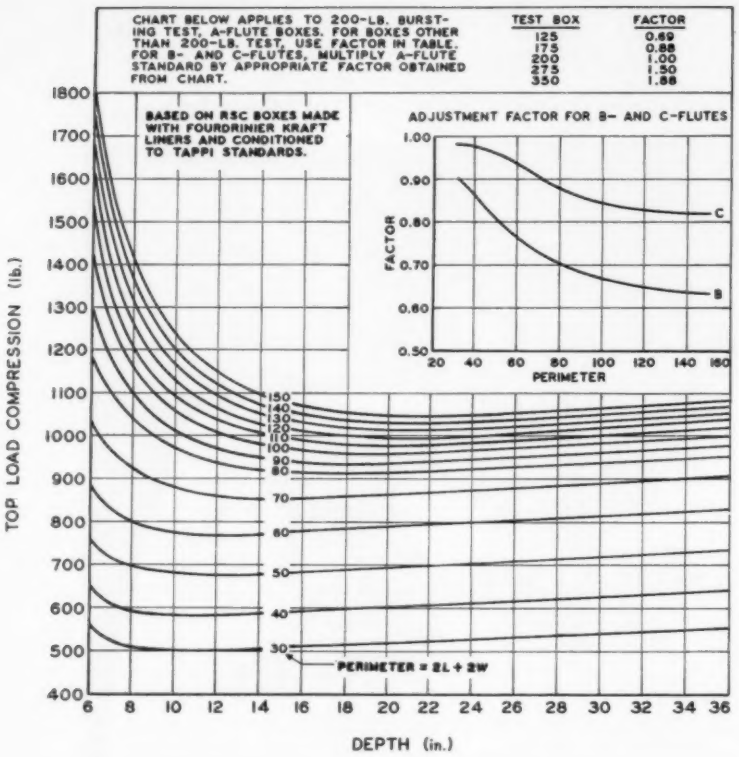
CHART BELOW APPLIES TO 200-LB. BURSTING TEST, A-FLUTE BOXES. FOR BOXES OTHER THAN 200-LB. TEST, USE FACTOR IN TABLE. FOR B- AND C-FLUTES, MULTIPLY A-FLUTE STANDARD BY APPROPRIATE FACTOR OBTAINED FROM CHART.
TEST BOX FACTOR
125 0.69
175 0.88
200 1.00
275 1.50
350 1.88
BASED ON RSC BOXES MADE WITH FOURDRINIER KRAFT LINERS AND CONDITIONED TO TAPPI STANDARDS.
ADJUSTMENT FACTOR FOR B- AND C-FLUTES
FACTOR
PERIMETER
C
B
TOP LOAD COMPRESSION (lb.)
DEPTH (in.)
PERIMETER = 2L + 2W

2 MINIMUM TOP-LOAD COMPRESSION expectancy to ¾-in. deflection. Aid in predicting top-to-bottom box strength, graph is like Fig. 1 but factors in variable of box depth. This factor makes computation more difficult but closer to actual results.

their deductions can be simply stated. First, the formula by which they arrive at box failure puts much emphasis on the crushing strength of board as do Maltenfort and Kellicutt. However, the equation they evolve also includes board variables of bending stiffness, torsional rigidity, and stretchability. Since they include all these variables as well as dimensions and flute factors, their equation is quite complicated. While this is not a simple approach, the report contributes toward a better understanding of the problem and a respect for its complexity.

Summary

Summing up these studies and reports on the subject of the stacking of corrugated boxes, what does

Modified column-crush test for corrugated boxes*

Here is the column-crush test as modified by Mr. McKinlay and used by GE for specifying the grade of corrugated board to be used in fabricating its boxes. This modified test complements Mr. McKinlay's article on predicting stacking strength of boxes, beginning on Page 60.

Scope

This method covers the procedure for measuring the resistance of paperboard to edgewise compression. Corrugated and solid fibreboard containers are subject to crushing forces in warehousing. The purpose of this test is to indicate the probable crushing resistance of the finished container.

Apparatus

a. Compression machine: The apparatus shall consist essentially of a compression testing machine (Fig. 1) having (1) an upper and lower platen, one of which may be fixed and the other movable. The surfaces of the platens shall remain smooth, flat and parallel to each other within 1 part in 2,000 throughout the test and shall be so mounted as not to have more than 0.002-in. movement in the horizontal direction; (2) means for exerting force on a specimen placed between the two platens. This may be accomplished either by (a) causing the movable platen to approach the fixed platen at a uniform speed, or (b) applying a constantly increasing pressure against the movable platen without necessarily causing motion thereof until collapse of specimen. In either case, the force applied to the specimen shall be developed at a rate equivalent to 25(±5) lb./sec. when the platens are in contact; (3) means for measuring and indicating the applied load within 1 lb.; (4) the machine should have the capacity of not less than 500 lb., and the indicating mechanism should be such that it can be accurately checked with deadweight loads.

b. Specimen holder: At the center of the lower platen on the compression testing machine, there shall be positioned a specimen holder (Fig. 2-1) consisting of a clamping device at least 4 in. long by ¾ in. deep. The device shall be tightened snugly against the specimen, without damage to the specimen. While this is the preferred design, any specimen holder, which provides support at both surfaces of the specimen and permits 0.25 in. of the specimen to

*Application as a standard method of test has been made to the American Society for Testing Materials, and the test is currently being reviewed. The compression machine (H & D Crush Tester), specimen holder, and cutting templet are available from Testing Machines, Inc., 72 Jericho Turnpike, Mineola, Long Island, New York.

it mean? Just this—a number of worthwhile attempts to get down on paper the practical experience of the corrugated industry, so that, in the future, the strength of a corrugated box can be calculated with somewhere near the same degree of accuracy that mechanical engineers have had when designing bridges, skyscrapers, etc. These engineers had only to refer to strength-of-materials tables to get values for substituting in the design formulas. But, nowhere in these tables do the values appear for corrugated paperboard.

True, corrugated is a considerably different material than steel, in that it has "creep" or fatigue characteristics approaching 50-per cent loss of strength when stressed for a year's period. Also, it not only "creeps" like a sponge, but absorbs water from the atmosphere much as sponges do. But, even with these characteristics, there is no good reason why published values are not available.

Specify Column-Crush Test

The corrugated industry and its customers have known for a long time that burst or Mullen test is the wrong way to specify corrugated board. Witness the fact that American Society for Testing Materials will not write a standard method for doing it. Add to that, the recent court decision which decided, for all practical purposes, that Rule 41 in reference to Mullen test doesn't mean a thing. Where does that leave you? A $2,000,000,000 business being conducted on a gentleman's agreement.

Usually, there aren't many complaints, but there are some that can involve a great deal of money. Therefore, why not start ordering corrugated board the way we should, by specifying what we want it to do, through the column-crush test? We'll not only get what we want, but we'll be able to predict what corrugated will do!

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(1) Angell, B.S. and Paslay, P.R., "Prediction of short-time static compressive strength of corrugated fibreboard containers" (Schenectady: General Electric Co., General Engineering Laboratory), Report No. 57GL47, Aug. 1, 1957.

(2) Balkema, E.H., "Analysis of corrugated boxes from buyer's viewpoint," *Fibre Container*, 34 (1949), No. 10.

(3) Balkema, E.H., "Quality control of corrugated boxes—buyer's viewpoint," *Fibre Containers*, 35 (1950), No. 6.

(4) "Compression test expectancy of corrugated boxes" (St. Louis: Gaylord Container Div., Crown Zellerbach Corp.).

(5) Kellicutt, K.Q., "Structural design notes for corrugated containers," PACKAGE ENGINEERING, Notes 1 through 20, Feb. 1959 through Sept. 1960.

(6) Kellicutt, K.Q. and Landt, E.F., "Basic design data for the use of fireboard in shipping containers" (Madison, Wis.: U.S. Department of Agriculture, Forest Products Laboratory), Report No. D1911, Nov. 1951.

(7) Kellicutt, K.Q., Landt, E.F., and Setterholm, V.C., "Box strength calculator" (Madison, Wis.: U.S.D.A., FPL), Report No. R1911-A, Dec. 1952.

(8) Maltenfort, G.G., "Compressive strength of corrugated containers," *Fibre Containers:* Part I, July 1956, pp. 44-57; Part II, Sept. 1956, pp. 60-74; Part III. Oct. 1956, pp. 52-59.

(End)

extend above the surface of the holder and allows insertion without injury to the specimen, is acceptable.

c. Cutting templet: A flat metal plate (Fig. 2-2) having two parallel slits 0.015 in. wide by at least 4 in. long. By inserting a knife (Fig. 2-3) through these slits, a clean, sharp, parallel specimen (Fig. 2-4) can be cut. The parallel slits shall be exactly 1 in. apart at their centers.

Test Specimens

All test specimens (Fig. 2-4) shall be 4 in. long and 1 in. wide with the 1-in. dimension parallel to corrugations unless otherwise specified. At least six specimens shall be exercised to assure that the (1) long edges are parallel to within 0.015 in.; (2) the long edges are truly perpendicular to the direction of corrugation; and (3) the long edges are cut clean without wipe or being torn or frayed in any way by poorly functioning cutting equipment.

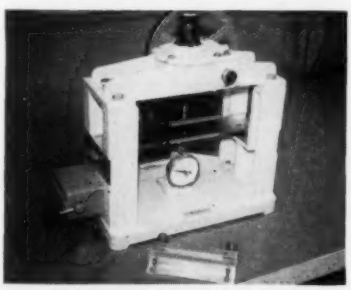


Fig. 1. Compression machine.

Conditioning

The test shall be made in an atmosphere conditioned according to the "Standard method for conditioning fibreboard containers for testing" (ASTM D 641-49) and after the specimens have reached equilibrium in the specified atmosphere.

Procedure

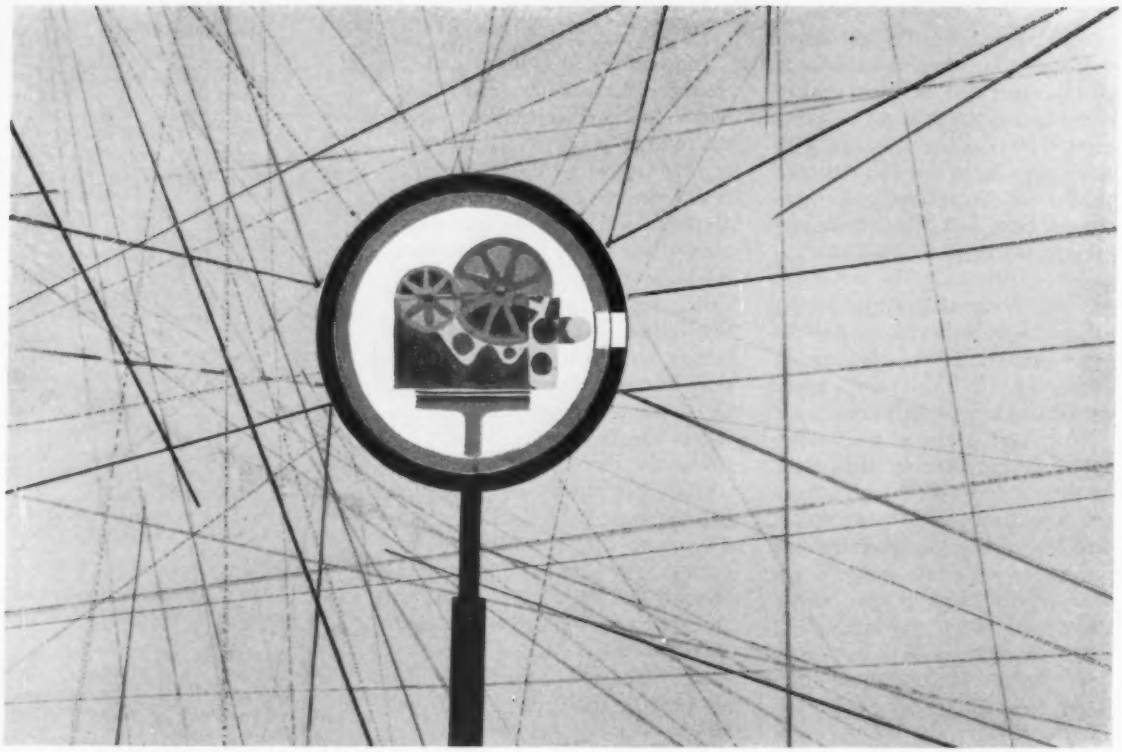
a. Insert each specimen in the specimen holder and position at the center between the two platens.

Fig. 2. Associated equipment for column-crush test: (1) specimen holder, (2) cutting templet, (3) knife, and (4) test specimen.

b. Apply the crushing force to the long edges of the specimen until the 0.25-in. section projecting above the specimen holder has collapsed. Record the maximum load required to cause this collapse. Test at least six specimens cut from the board.

Report

Report the average load to crush the sample in lb./in. to the nearest tenth. State whether the crushing force is developed by means of a constant-speed movable platen or by the application of a constantly increasing pressure to the movable platen. *(End)*



1 COSMIC RADIATION, one of most severe environments, is expected to present greatest difficulty to packaging engineer. Movie film, for example, is completely ruined when subjected to very small amount of cosmic radiation. Lead shield will protect film and camera, but will add weight to package. Ultraviolet radiation, another extreme environment, will cause problem as it will deteriorate rapidly such materials as plastics, rubber, polystyrene, and so on.

Packaging for lunar exploration

By Kenneth Brown, *Technical Staff, Space Technology Laboratories, Inc., Los Angeles*

It is not too soon for packaging engineers to start planning the structural and functional design of packages for movement through outer space. Some are already involved in this—preparing for the inevitable lunar exploration. In this connection, Mr. Brown reviews problems facing the packaging engineer regarding outer space and lunar environment, lunar impacts, shock load characteristics, and nonconventional impact. His thought-provoking discussion cuts through much of the current confusion about "packaging for the moon" and offers some concrete figures about the packaging challenge of the future.

Because of the advances made in recent lunar and planetary probes, it would appear that soft lunar landings are not far away. Much research is presently being done in the establishment of design criteria for vehicles that will make these initial flights and in the determination of the space environment that the space vehicles will be subjected to during their flight path. Much speculation, too, has been made as to the lunar surface conditions and the effect these surface conditions will have in the first soft landing.

As justification for the first mis-

sion, it will be necessary to transport a television camera, transmitting equipment, power supply units, and a mass of electronic equipment. All of these items are relatively fragile and must be *packaged* correctly to withstand not only the trip but the landing on the moon.

OUTER SPACE ENVIRONMENT

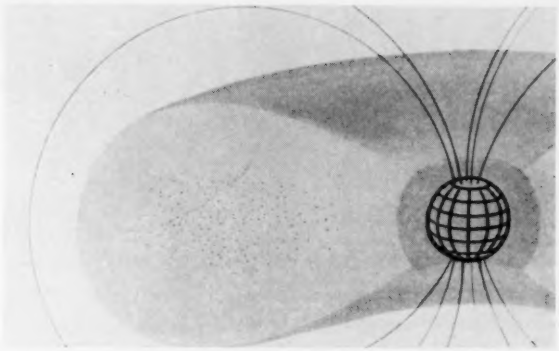
Throughout the trip through outer space, the vehicle and its packaged contents (Fig. 1) will be subjected to many of the little-known environments. One of the most severe environments is cosmic radiation which is expected to present the greatest difficulty to the packaging engineer. Fortunately for earth inhabitants, cosmic radiation is shielded by the earth's magnetic field.

But outside this field, the radiation particles are prevalent and can produce severe reaction. Actually, only a small portion of the radiation particles are charged and can produce detrimental action on materials. However, there is still a sufficient amount to require protection for many articles.

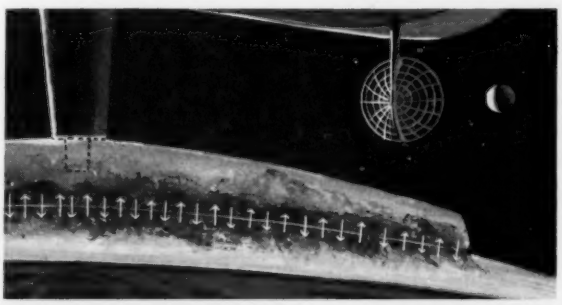
Fire From Where?

Further research and satellite firings may provide sufficient information on the amounts of cosmic radiation around the earth's surface to suggest that firing at certain times of the year or from certain locations may eliminate the need for protection. However, certain sun-spot activity develops cosmic storms that develop very high cosmic radiation. Unfortunately, these storms produce a much higher percentage of charged particles, and protection against damage is nearly impossible.

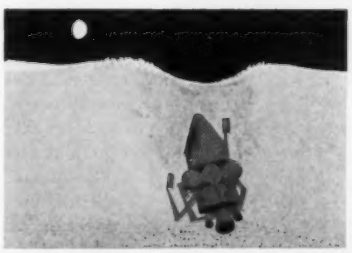
Based upon the present known radiation sensitivity, the minimum amount of activity is found at the polar regions and the intensity increases toward the equator. This region is known as the Van Allen radiation belt. From this information, it appears advisable either to fire the vehicle from the polar regions (Fig. 2) or to fire it from



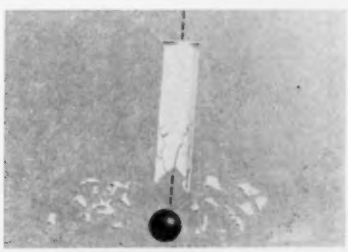
2 MINIMUM ACTIVITY OF COSMIC RADIATION is apparent at polar regions and intensity increases toward equator. Thus, it appears advisable to fire vehicle from polar region or from some specific location where it would pass through radiation belt above polar region.



3 IN VACUUM ENVIRONMENT, most metals will adhere together due to lack of air to act as lubricant—another packaging problem. Use of foam rubber for cushioning would be another difficulty—lack of air pressure and moisture allows it to expand and possibly explode.

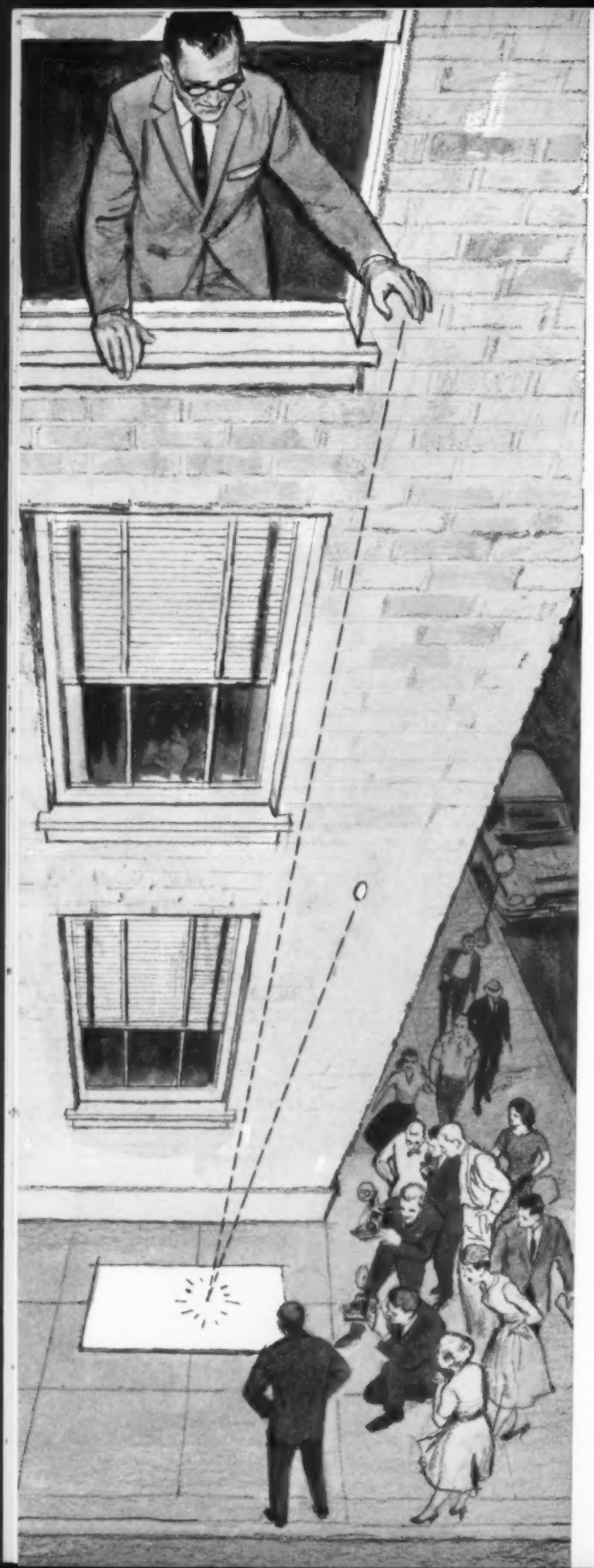


4 WITH DUST LAYER on moon (one theory: up to 30 ft. thick), landing vehicle would apparently drop from sight. But decreased gravity on moon makes this unlikely.



5 EVALUATING DUST condition, scale-model dust layer in glass tube (tested in lunar environment) reacted like solid rock when steel ball was dropped on it.

6 DAMAGE TO VEHICLE upon landing would occur if one theory about moon's surface is true—that dust layer several inches thick exists and contains free and unstable atoms which, when moved by landing vehicle, would cause exothermic reaction and would explode violently.



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It landed on three- qu

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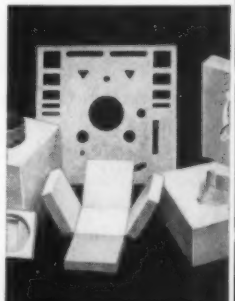
Dropping an uncooked egg 23 feet is far from being a scientific product test . . . but it is a dramatic way to illustrate new Resilo-Pak's amazing cushioning power.

This newly developed material is composed of millions of tiny polystyrene beads that have been expanded into molded form, and tempered to close tolerances for unidirectional resiliency and flexibility. Inch for inch and dollar for dollar, Armstrong Resilo-Pak is one of the most efficient shock-absorbing cushionings on the market today.

Resilo-Pak can be die-cut, bent, cemented, and scored to form almost any shape. Its thermal conductivity is low, allowing it to be used as a thermal insulator as well as a package cushioning. It is odorless, non-corrosive, non-dusting, and non-abrasive. In addition, product identification and instructions can be printed directly on its pure white surface.



Dynamic cushioning properties of Resilo-Pak

Since it is under dynamic conditions that products are shipped and handled, it is logical to evaluate cushioning materials the same way, re-creating in the laboratory conditions they endure in use.

The graph above right shows the protection offered by three different thicknesses of Resilo-Pak 300 at a 30-inch drop height. Note the amazingly uniform G level over a wide unit load (static stress) range.

Continuing evaluation of the dynamic cushioning properties of Resilo-Pak is going on at Armstrong's Research and Development Center. Results show good agreement with *static* test data on Resilo-Pak, which is not the case with many other kinds of cushioning materials.

120-G'
100-G'
80-G'
60-G'
40-G'
20-G'

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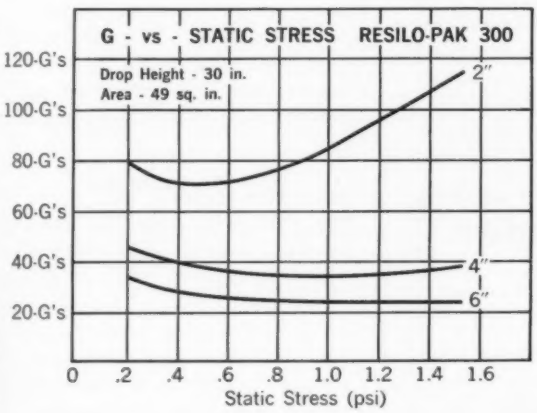
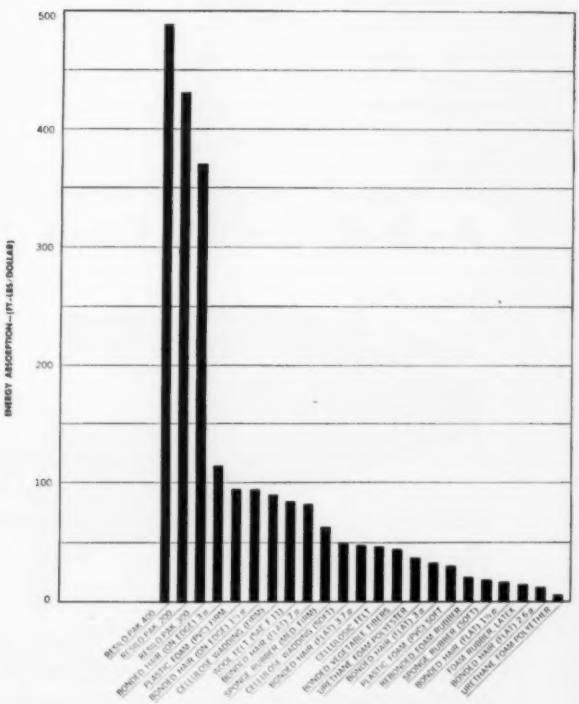
quarters of an inch of Resilo-Pak, the TRADE-MARK package cushioning from Armstrong





Energy absorption per dollar

Chart at right shows results of static laboratory tests on many commonly used cushioning materials. Resilo-Pak's energy absorption per dollar ranges from three to forty times greater than that of any other cushioning product that was tested. It also has a striking ability to retain its high energy absorption, from – 80°F. to + 165°F.

Summarizing Resilo-Pak

Armstrong Resilo-Pak is a new cushioning material that absorbs more energy per dollar than any similar material and maintains its energy-absorbing ability over wide loading and temperature ranges. Its high energy absorption and low density create an opportunity to reduce packaging costs: (1) by reducing the amount and cost of cushioning material, (2) by reducing the size and cost of the package, (3) by reducing cubage and the expense of shipping and warehousing.

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Kenneth Brown holds a B.S. from University of New Mexico and an M.S. from University of Southern California, both in mechanical engineering. Before joining Space Technology Labs, he was senior thermodynamics engineer with Convair, a technical staff member of Hughes Aircraft, and senior research engineer at North American Aviation. He taught mechanical engineering at USC for two years, and for the past five years has been on UCLA's technical teaching staff. Lecturer, and author of *Package Design Engineering*, Mr. Brown is a member of SPHE, American Material Handling Society, Tau Beta Pi, Pi Tau Sigma, Sigma Xi, and American Ordnance Association.

some specific location on earth where the vehicle would pass through the radiation belt above one of the polar regions.

Materials Vulnerable

Another extreme environment is ultraviolet radiation. Again the earth inhabitant is protected against this radiation by the earth's atmosphere in which this type of radiation is absorbed by ozone. However, many materials do deteriorate when subjected to this radiation. The most affected materials are plastic, rubber, polystyrene, and Teflon.

These materials are quite common in package construction, and their use will be limited unless they are protected with an opaque shield which adds to the weight problems. Materials eventually deteriorate into granular form through constant radiation subjection and have a very noticeable drop in tensile strength upon intermittent radiation contact.

When Metals Fuse

One of the major problems that will confront both the packaging and the materials engineer is the fusion of metals in a vacuum (Fig. 3). Nearly all types of metals will adhere together in a vacuum environment; the amount of adhesion is proportionate to the smoothness of the surfaces. Bonding is created by lack of air to act as a lubricant; so, two highly polished metals will provide more surface area for adhesion than two rough surfaces. As yet, the required forces to separate such bonds are unknown. In areas where moving metal parts are a necessity, either a materials substitution will be necessary or a pressurized system must be incorporated into the vehicle.

In the vacuum environment, another difficulty for the packaging engineer would be use of any type of foam rubber for a cushioning material. The lack of air pressure and moisture would allow the rubber to expand and possibly explode.

LUNAR ENVIRONMENT

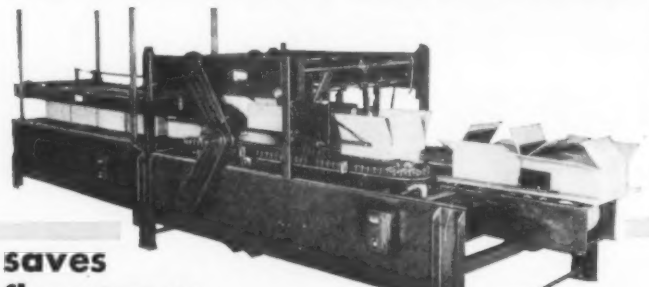
Before the impact loads or shock loads of a space vehicle during a lunar landing can be determined, it is necessary to evaluate the surface conditions of the moon. Many theories have been presented on what these surface conditions might be.

Dust On Surface

The first of these theories maintains that, on the lunar surface, there is upward to 30 ft. of fine dust. It would appear that under such a condition, the vehicle, upon landing, would drop completely from sight (Fig. 4). Fortunately, with the decreased gravity and atmospheric environment on the moon, this could not happen. A simulated laboratory test was performed to evaluate this thick dust-layer condition.

A steel ball was dropped inside a glass tube onto a scale-model dust layer, and, with the entire experiment enclosed in a lunar environment, the dust reacted like solid rock (Fig. 5). Under the lunar atmospheric environment, the fine dust took on a sand-like structure and could be compared to the coarse desert sand prominent on the western deserts of the United States. With the decreased gravity, the ball did not fall with the impact force that would occur in the earth's surface.

A-B-C Short Case Sealer



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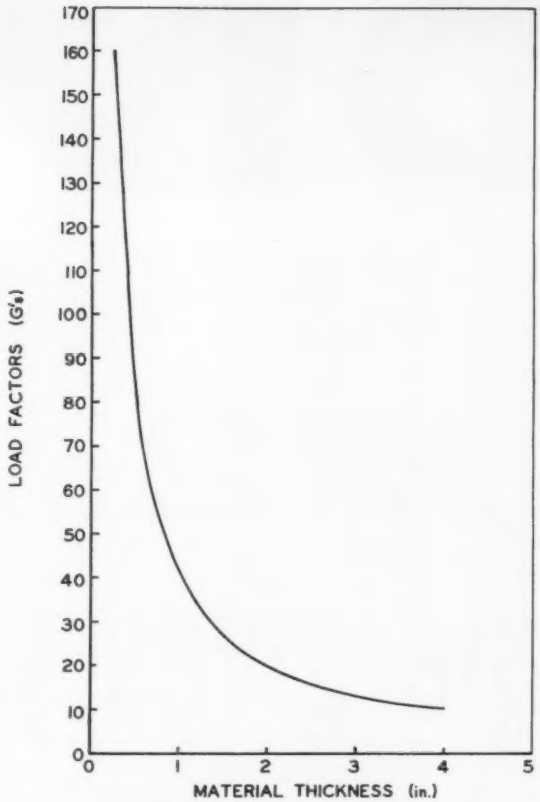

7 **CRUSHING-TYPE MATERIAL** would apparently absorb shock more efficiently than elastic system when penetrating-spiked vehicle lands on moon. Note load factor increases rather rapidly below 1-in. thickness; however, with ¼-in. material, it will be only 160 — within limits of most transistorized electronic equipment of today. (Data from 20-in. flat drop on concrete—equal to 10-ft. lunar drop.)

May Be Hard Lava

A second theory states that the lunar surface is hard lava. It was originally assumed that the craters and mountains were formed from volcanic action and, therefore, the surface of both would be composed of solidified lava beds. This theory has been nearly abandoned, however, as it is now believed that the great majority of the craters were caused by explosions resulting from impact of high-velocity meteorites.

Such theories have been supported by the present shape of the craters and mountains, and by the knowledge that today there is not a single active volcano on the moon. If this theory is true, the possibility is extremely great that a fine layer of dust exists on the flat areas of the moon. The impacts by small particles, as well as by ultraviolet light and soft radiation from the sun that strike the surface under the impediment of the lunar atmosphere, are all likely to cause the destruction of any rock-like material into a powder or dust. Due to active storm conditions, this dust may be blown into craters and become thick, while on mountains and ridges a small layer will exist.

Unstable Atoms A Problem

A fourth theory maintains that a dust layer several inches thick exists, which could have a violent reaction on surface landing crafts.

(Turn page)

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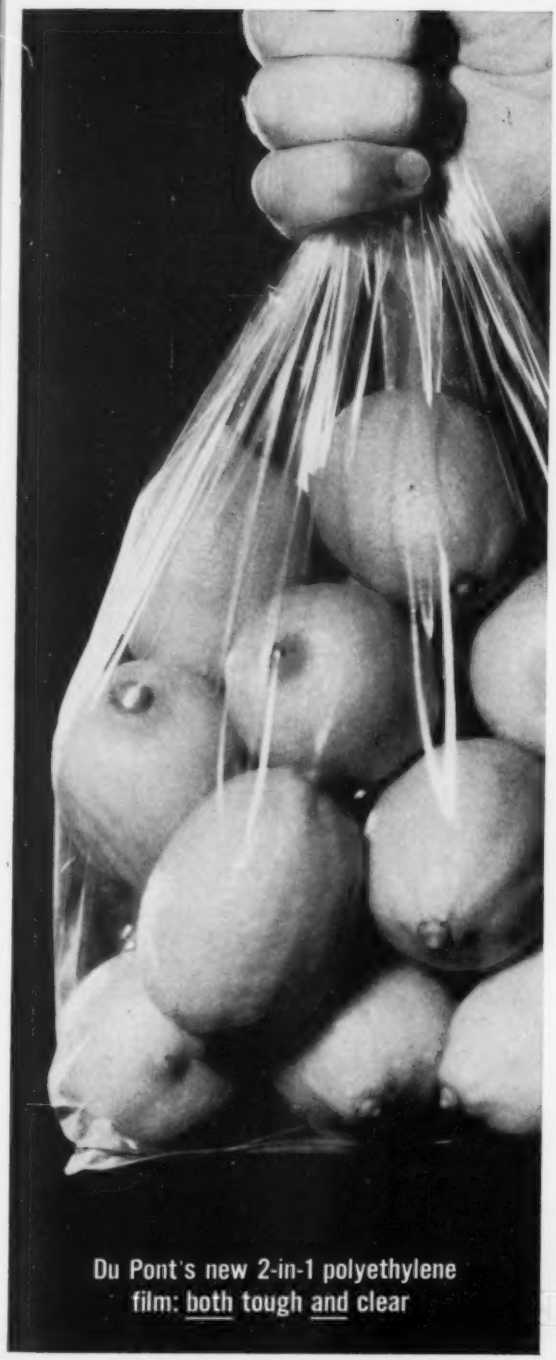
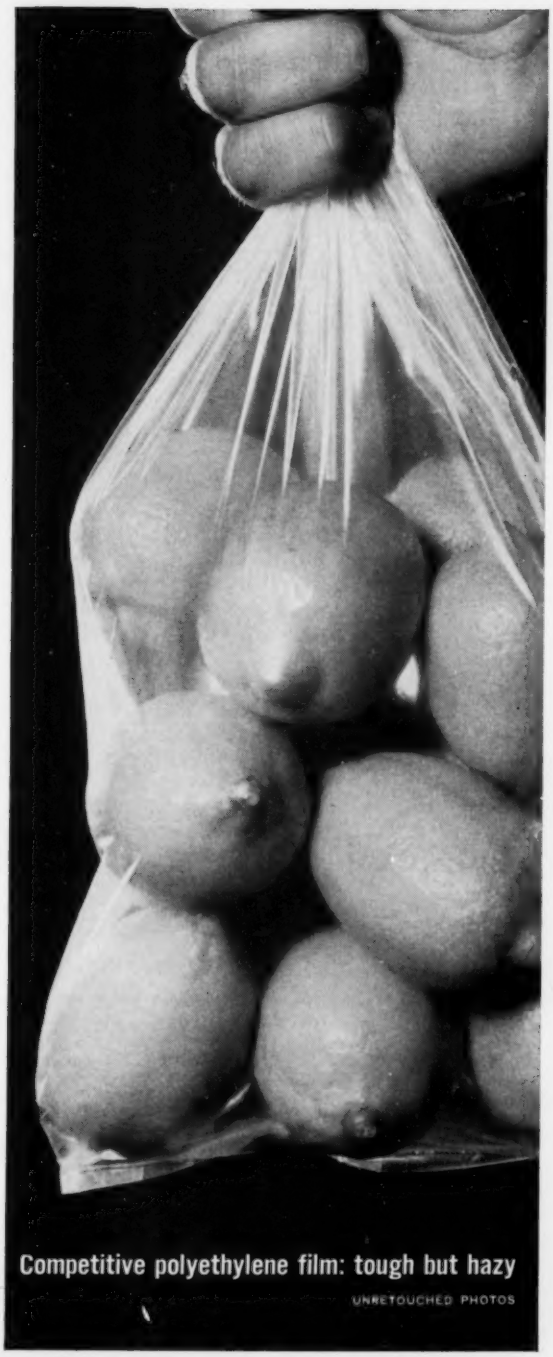
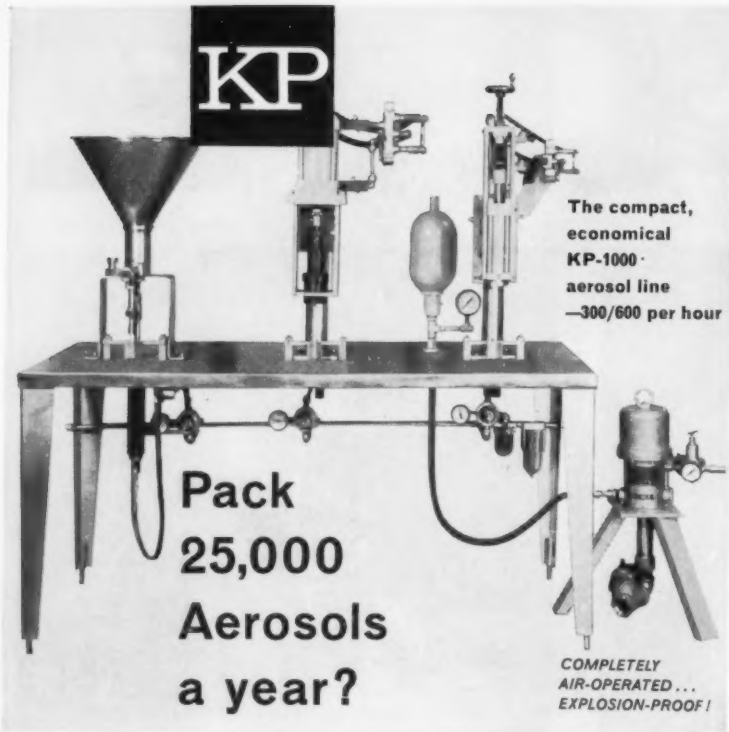


Du Pont's new 2-in-1 polyethylene film: both tough and clear



Competitive polyethylene film: tough but hazy

UNRETOUCHED PHOTOS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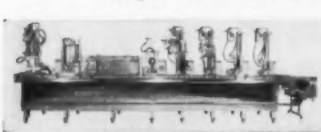

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This theory also assumes that dust is formed from meteorites, but that it will contain many free radicals. These radicals, which are free and unstable atoms or molecular fragments, will remain dormant at the extremely low temperatures which exist on the shade side of a crater or mountain and below the top surface layer of dust.

When subjected to intense solar radiation, however, they become quite active and have explosive power when searching for a companion atom. Should this condition exist, the free radicals would be lying under the upper surface of the dust, and when moved by a landing vehicle, would cause an exothermic reaction and explode violently (Fig. 6).

Dust Like Hard Sand

A fifth theory, the final to be mentioned here, states that the lunar surface is covered with a varying depth of dust which has a hard sand consistency. This theory is based upon the reaction of lunar dust with meteoric dust; also, upon molecules and atoms from meteoric impacts being subjected to intermittent solar radiation at low-density environment which produces a chemically mixed spray. This spray would act as a cement between the grains, and form a heterogeneous substance similar to hard sand.

So, regardless of which theory is correct, it can very definitely be assumed that the dust, because of the lunar environment, will react as a fairly hard sand or, more likely, as a pumice-type rock. But as the hardness of the surface will definitely vary with the depth of the dust, it would be necessary to assume a varying degree of crushing strength of the lunar surface material.

LUNAR IMPACTS

There are two methods for landing the first instrumented vehicle on the moon. The first is a soft landing in which the retrorockets will slow the vehicle to a zero velocity approximately 10 ft. above

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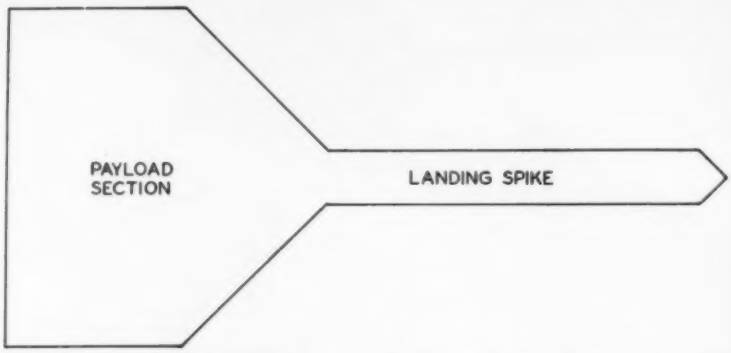
the moon's surface—then the vehicle will drop in. From a packaging point of view, a 10-ft. lunar drop is equivalent to approximately a 1.7-ft. drop on the earth's surface. This is because of the decreased gravity environment on the moon. The surface gravity of the moon is 0.16 (approximately ⅙) of the surface gravity of the earth. This would then be equivalent to a laboratory 20-in. drop test.

Use Penetration Spike

The second method for an instrumented landing would be the use of a penetration spike. In this method, retrorockets would again be used to slow the vehicle to 100- to 500-ft./sec. velocity; the vehicle would be equipped with a spiked nose for penetrating the lunar surface.

Such a system is easier to develop, but would increase the packaging engineer's design requirements. Severe shock loads would exist within this range of impact velocities. Also it is important to have a fairly good understanding of the crushing strength of the lunar surface to be able to approximate the shock loads during the penetration of the spike.



8 **PENETRATING-SPIKED VEHICLE** for moon landing might look like this. To establish some basic values of impact velocities and penetration depth for spiked vehicle, this design was used. Weight was chosen as 100 lb., spike diameter as 3 in., for purposes of calculation.

SHOCK LOAD FEATURES

As stated, the impulse velocity for a penetrating-spiked vehicle would range from 100- to 500-ft./sec. On a comparison basis, the impact velocity for a 20-in. drop (10-ft. lunar drop) would be approximately 10-ft./sec. Under such conditions, the shock loads would not be severe, and it would be assumed that a crushing-type shock-mounting system would be used.

An instrumented landing would have only one shock load, and the crushing-type material is much more efficient than an elastic system, which is required when a package will undergo many han-

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dling operations. As shown in Fig. 7, the load factor, G, increases rather rapidly below the 1-in. thickness; however, even with ¼-in. material, the load factor will only be 160 which is within the limits of most transistorized electronic equipment built today. If an elastic-type material were used, the load factors would be close to twice those indicated in this graph.

What Impact Velocity?

In the case of the penetrating spike, a much higher load factor would be witnessed because of the higher impact velocities. In this case, many other factors must be considered. The crushing strength of the lunar surface will affect the penetration depth, thereby affecting the load factor. Also the weight-to-diameter ratio of the spike will have noticeable effect upon the depth of penetration, thereby affecting the load factor.

It would appear that a lower impact velocity would be desirable; however, it must be remembered that the vehicle is designed to land with the spike imbedded in the lunar surface, to hold the antennas and other instrumented equipment in a pre-determined position. Should the penetration not be deep enough because of too low an impact velocity, the vehicle would topple over and might not function correctly. For this reason a minimum impact velocity of 100 ft./sec. is required.

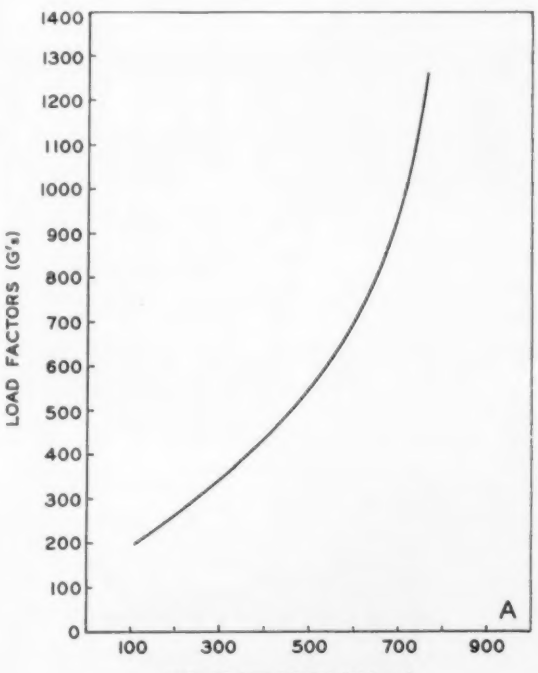
Design Assumptions

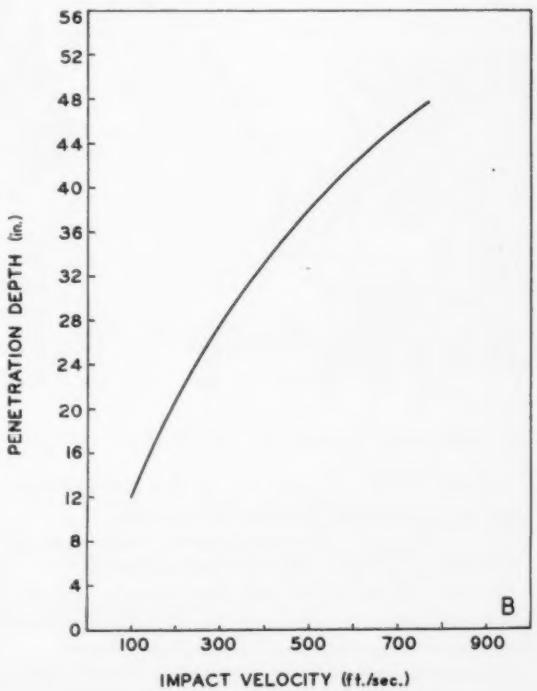
To establish some basic values for a penetrating-spiked vehicle, it is necessary to assume some of the design characteristics and provide a specific sized vehicle. Calculations, therefore, have been based upon a vehicle shaped as shown in Fig. 8. The weight was chosen as 100 lb. and the spike diameter as 3 in.

For purposes of calculation, the crushing strength of the lunar surface was assumed as the pumice-type rock which is generally porous and has strength characteristics comparable to weak sandstone. Crushing strength for such a material is approximately 2500 lb./sq. in. From these values and assumptions, the load factor with varying impact velocities is shown in Fig. 9A; with penetration distance, in Fig. 9B.

At the minimum impact velocity of 100 ft./sec., the load factor is approximately 200 G's while the penetration distance is 12 in. As stated earlier, most transistorized electronic equipment can withstand these values; however, a small amount of cushioning material would appreciably reduce this load factor.

Above an impact velocity of 250 ft./sec., however, the G values become quite large; the packaging engineer would have considerable difficulty in protecting the equip-





9 PENETRATION DROP on pumice-type rock. For calculations, crushing strength of lunar surface was assumed as this type rock, generally porous and with strength comparable to weak sandstone. Crushing strength for such material is about 2,500 lb./sq. in. From this data, load factor with varied impact velocities (A) and with pentration distance (B) were developed. Note: At minimum velocity of 100 ft./sec., load factor is about 200 G's, while penetration distance is 12 in. Most transistorized electronic equipment can withstand these values; however, small amout of cushioning material would reduce load factor appreciably. Above impact velocity of 250 ft./sec., G values become quite large, and packaging engineer would have considerable difficulty protecting equipment.

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ment. If the surface conditions have a higher crushing strength, the load factors would rise sharply and the penetration depth would decrease noticeably.

Under these conditions, a major problem may exist. The minimum impact velocity would have to be increased because the penetration into harder soil would be considerably less and possibly insufficient to hold the vehicle upright. However, by increasing the impact velocity, the load factor increases; but, with a further increase for hard soil, it may become impractical unless sophisticated shock mounts are used.

Must Withstand Heat

This leads into the final problem of solar radiation for lunar landings. If a sophisticated shock-mounting system is required, the problem of providing a material that will withstand the extreme heat and cold becomes paramount. Solar radiation on the moon's surface causes temperatures to 400°F., while in the shade of a crater or mountain, the temperature may be as low as –400°F. With a temperature range of 800°F., it is impossible today to find a material that will function satisfactorily.

NONCONVENTIONAL IMPACTS

There are several nonconventional ways of impacting an instrumented vehicle on the moon. Some of these are: parachute land, orbital coast, ricochet and rebound, and use of special type shock absorbers. Most of these possibilities are unattractive at this time.

The parachute type is impractical because of the low lunar density; at the lunar environment, a parachute would not even open. An orbital coast would require more flight time for landing the vehicle and heavy, complicated equipment to sense and control the landing operation. Although ricochet and rebound would dissipate the energy of the landing vehicle in a series of smaller impacts, the path is indeterminate and the analysis of such a system is highly complex. Also, a relatively smooth landing surface would be essential, and the crater and mountainous terrain could cause extreme difficulty.

Finally, the system using shock absorbers would greatly increase the weight of the vehicle, and shock absorbers, either mechanical or fluid, would have considerable difficulty functioning in the high- and low-temperature environment.

CONCLUSION

These are a few of the problems that the packaging engineer will be, and is, confronted with in designing protection around the instruments that must be on board the first lunar exploratory vehicle. Much of the design, by necessity, will be based upon parameters of the lunar environment that are assumed. Until the first few vehicles have been successfully landed, it will not be known whether the assumptions were good or bad.

(End)

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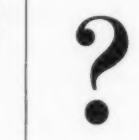


By Edward W. Love, *Director, Machinery Research and Development, Bristol-Myers Products Division, Bristol-Myers Company, Hillside, New Jersey*

You may need a simple gadget to perform a given packaging operation—or high-speed, fully automatic machinery. Mr. Love points out that, either way, you should consider many related factors before getting equipment. He offers a guide to make your selection easier—including what to know about the product and the package, where to look for equipment, and what to look for. He outlines a scrapbook of machinery literature—an aid he finds invaluable when making equipment decisions.

The selection of packaging machinery is a broad and controversial subject. There is no ready-made checklist or formula to tell you what is the best machine for your specific needs. It is possible, however, to set down some of the factors you should consider in making your selection.

Select Category

Packaging operations can probably be set into four categories, the first being packaging entirely by hand with no thought to other than the very simplest devices—perhaps a funnel to facilitate filling a bottle. The second category is also a hand operation but would include the use of as many jigs, fixtures, and gadgets as would make the operation the most efficient. The third category substitutes semi-automatic machinery for many of the hands and the jigs, fixtures, and gadgets. The fourth category is obviously use of fully automatic machinery.

Probably the first thing to decide is the category into which the packaging operation you are considering will fall. Generally, you will only do the operation entirely by hand for one-time, short runs, occasional sample runs, or test runs; also, where sales deadlines do not permit even simple tooling, and "hands" are available. Therefore, you consider only the first category.

The second category applies most often also to low-volume runs, variety runs, and longer one-time runs. Perhaps only a few hundred of the item are required once a month. Maybe it is a pre-packed display of some type for a special promotion, or a combination of products for a "deal" or a "test city" operation.

The number of units required and the time in which they must be made available generally settle the issue for categories three and four. That is not to say that they are the only factors, but usually the first thing any production man will ask is: "How many?" and "How soon?"

The decision then, as to the type of operation, really must be made first. To help make this decision, you should know:

How many?
How soon?
One shot?
Test operation?
Long haul?

Nothing is said as to the cost of one type of operation as opposed to the other. Quite obviously, cost is a mighty important consideration and will be a factor in the final decision. On the other hand, figuring costs is generally a well-established procedure in most production plants, and for that reason will not be discussed in this article.

It might be well, before leaving the subject of deciding the category into which your operation will fall, to point out that a combination of the categories can also be used.

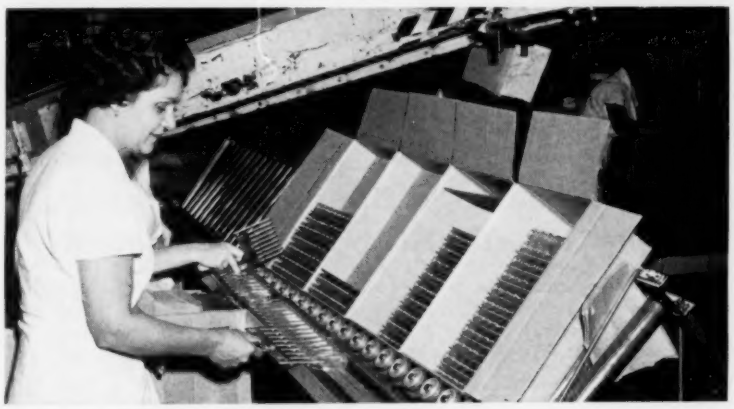
Know Your Product

Let's assume you have decided on the plan you will follow. What are some of the things you must know if equipment is required in your plan? You must have complete details on the product to be handled. Is the product a powder, liquid, paste, cream, tablet, etc. Can it be pumped without damage to the product? Will it flow by gravity? Can it be warmed, cooled, or agitated to help make it flow better for filling? Are special metal or plastic contact parts needed to avoid product contamination? Does product foam excessively? Will the product seek its own level quickly in its container so that air will not be entrapped?

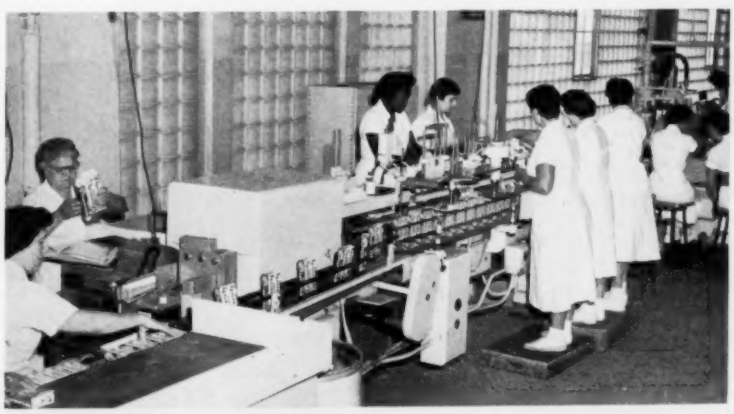
Perhaps the product you are to handle is similar to one you are already handling, so that most of the answers to the foregoing questions will be readily available. Maybe you can go to your pilot plant, if you are lucky enough to have one, for trial runs.

In many instances, machinery manufacturers will run tests for you, or make experimental equipment available to you either on a rental or loan basis. Get as many details on the product to be handled as you reasonably can, for the treatment which must be accorded the product will greatly influence your selection of filling equipment. *(Turn page)*

MANUAL ASSEMBLY AND PACKING of Bufferin promotional pack. With U-shaped line and supplies in center, assembly moves both ways and complete packs come off each end of U.



NINE-PRONG FORK-LIKE GADGET eases operator handling when transferring empty Ban bottles from shippers to conveyor leading to elevator. Simple device makes operation efficient.



SEMI-AUTOMATIC PACKAGING LINE contains tube filler (right background) and cartoner (center), both act as substitutes for many hands, jigs, gadgets, fixtures, and other devices.

SILICONE NEWS from Dow Corning

Such Sweet Parting

Silicone Coatings Speed Unpacking, Reduce Waste, Step Up Production

Dates, candy, sweet rolls . . . will always be sticky, but that's no problem in packaging now that Syl-off® coated papers are readily available. Syl-off silicone paper coatings provide stickproof surfaces to a wide variety of food packaging materials and in-plant processing aids — kraft, parchment, glassine, boxboard, drums, bags, interleaving liners — permit quick, easy and complete removal from even the stickiest food products.

Food grade Syl-off coatings don't migrate, don't contaminate, don't transfer . . . and the use of paper coated with these silicone anti-adhesives to package foods is in compliance with provisions of the Food Additives Amendment of 1958.

For labels, too. As backing for labels, price stickers, banners, decals, and similar pressure-sensitive items, Syl-off coated paper peels free with ease — eliminates tearing, cuts waste, saves time.

Benefits you . . . whether you be packager or user. Syl-off coated papers come away cleanly and easily from the stickiest products — save time and money — help create repeat sales. Everyone gains.

What's your sticky problem? Will Syl-off solve it? Write today for more information and complete list of Approved Sources for Syl-off coated wrapping papers, bags, containers, drums, and processing aids with Syl-off coatings. Dept. 6410.

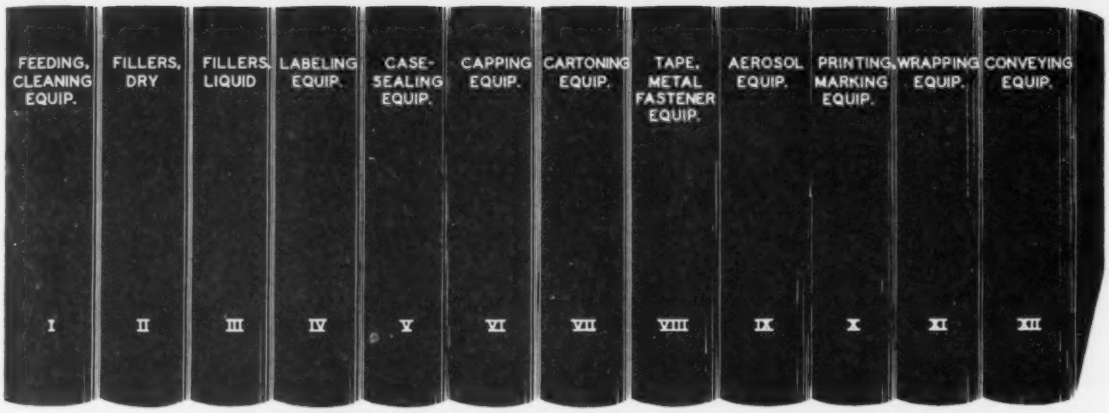
For most efficient foam control in food processing, it's Dow Corning Silicones, too. Send for a copy of the new manual "ABC's of Defoaming".

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

For more information circle No. 255 on Reader Service Card



SET OF "SCRAPBOOKS" is invaluable aid when searching for proper packaging equipment. With loose-leaf notebooks organized like this, when you see any ads or literature on packaging machinery that look interesting to you, cut them out and paste them in scrapbooks.

Have Complete Package Spec's

You will also need to have complete packaging specifications: the size and type of your basic container, the stated filling weight, volume or count, as well as the number of sizes to be handled. You must know the size and style of caps; and the size, material, and shape of label. Take care that the label size is realistic in relation to the labeling area. It is pretty hard to label a baseball!

You must know whether the basic container is to be individually cartoned, whether it will contain a leaflet or protective corrugated liner or some other piece of goods besides the product. Will there be an intermediate pack commonly known as a shelf unit, and if so, how many units will there be to this intermediate pack? And finally, how many units of containers to a shipping case? The more information you can gather along these lines, the easier your final selection of equipment and layout of equipment will be.

Get Sales Requirements

No intelligent decision on equipment can be made without sales requirements in terms of units. If at all possible, this information should be more specific than total requirements for a year, particularly in the case of a new product. You should get the number of units required for the initial stocking and introduction of the product as well as the anticipated number of units needed by months for at least six months following the introduction.

If the product is an established one, past trends and forecasts will generally be sufficient. This type of information is important, for it is one thing to produce an annual sales requirement of, e.g., 100,000 gross in twelve equal monthly installments, and quite another to have to get the entire quantity out in three monthly installments.

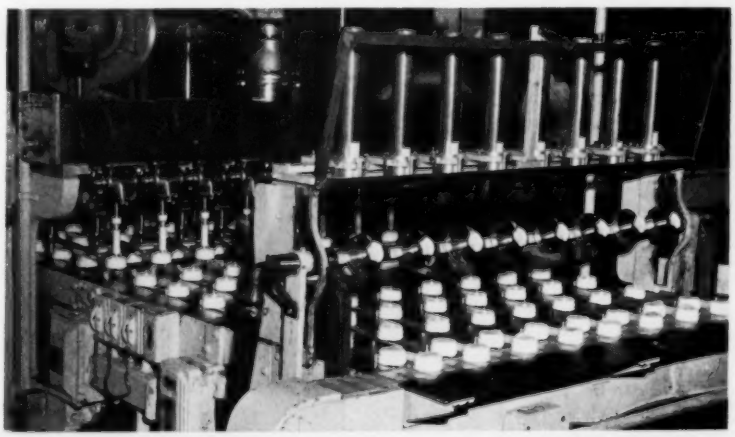
Shelf Life Vs. Inventory

Your problem may be further complicated by limited product shelf life and expiration dates so that building large inventories well in advance of concentrated sales periods cannot even be considered. Furthermore, large inventories of finished stock on hand cost money.

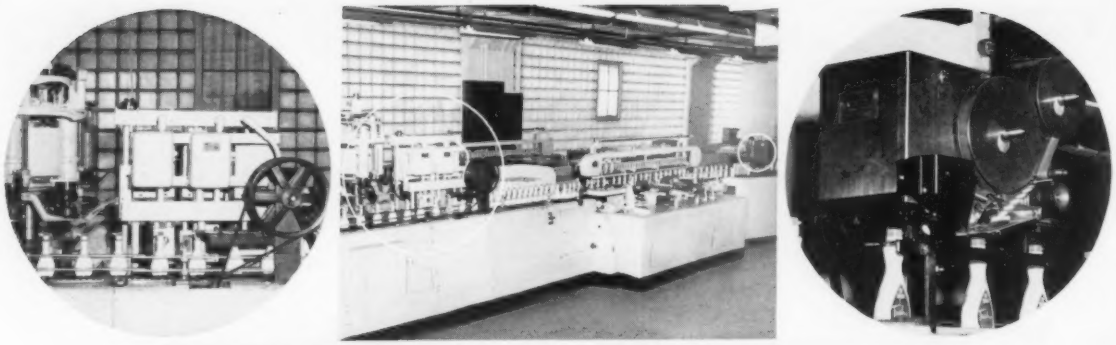
The actual translation of sales requirements into production is not in itself particularly difficult if the sales requirements are accurate and broken down by months; in some cases, maybe even by weeks, for most companies operate on some finished stock inventory. One method for planning might be:

1. Assume company policy is to have on hand at the end of each month enough finished stock to meet the sales requirements for the following month;
2. Assume sales forecasts are available by months for three months in advance at the planning point.

Then you have:



FULLY AUTOMATIC FILLER cleans, fills Mum jars, as well as applying parchment discs at speeds above 175 jars/min.—a good example of high-volume production warranting automation.



SUPERIMPOSED EQUIPMENT on existing line can be beneficial. Note in line (center photo) that capper at far left is by-passed in favor of compression wheel (left photo) for Trushay dispensers on bottle; at far right, automatic price sticker dispenser (right photo) is superimposed for special purpose.

Finished stock on hand Dec. 31	1,000 gross
Estimated sales for Jan.	1,000
Wanted on hand Jan. 31	850
Production required	850

By following this plan at least two to three months in advance, long-range plans can be made not only by production but by purchasing and others as well. Labor levels and equipment loads can also be balanced by going long or short on inventories of finished stock.

But, to get back to equipment selection, some of the things you must know before you start your search for same are:

1. Complete product specifications;
2. Complete packaging specifications;
3. Product handling information;
4. Special packaging information;
5. Sales requirements.

Where To Look

With this information at hand, you can begin to plan your equipment. Where do you look for appropriate equipment? Your first look with a new product should be at integration to existing lines; then your current machine suppliers, if you have been satisfied with their equipment and service. There are advantages in doing this.

Your current suppliers should have a better understanding of your problems. You should be able to give them details of the shortcomings of equipment already on hand. Your mechanical force will be able to make use of its past experience when the new equipment arrives. In many cases, at least some of the spare parts and change parts on hand will serve either machine. Maybe most important of all, you will know with whom you are dealing and what to expect.

Visit Other Users

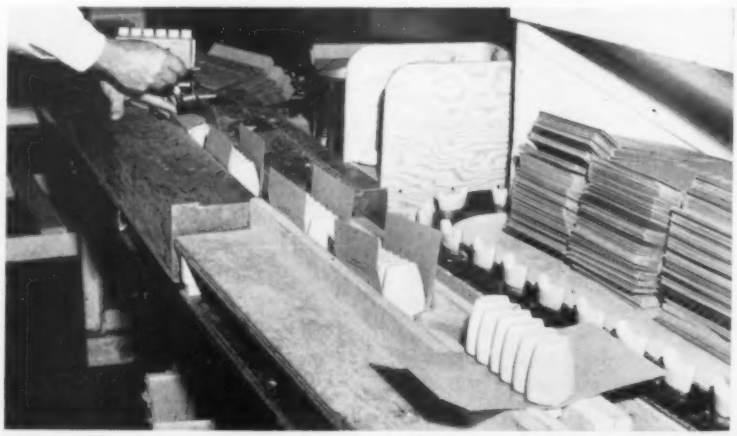
Many times you will have viewed equipment which might be satisfactory for the job you have in mind, from visitations to other plants. You certainly can get good information on machine performance from other users, and if you don't happen to have a contact in the plant where the equipment is located, the machine supplier can always arrange a visit for you.

It should be emphasized at this point that plant visitations are very worthwhile not only from the associations you make but from the knowledge to be gained on how the other fellow does the job. It is not necessary that the plant be in an allied industry; in fact, very often an unallied industry does its packaging by less stereotyped methods from which you may well get ideas to adapt to your operation.

Keep A Scrapbook

In your search for the proper packaging equipment, you will find it worthwhile to keep scanning the various trade magazines and publications, as well as the many pieces of mail literature that come in daily. When you come across something that looks interesting, cut it out and put it in a machinery supplier scrapbook.

It is comparatively easy to do this and to set the book up so that all similar types of machines are grouped under the same heading.



HAND ASSEMBLY of Mum Mist in chipboard, wrap-around sleeve. Note that operator is aided by wooden jigs which hold squeeze bottles and sleeve in place to facilitate gluing bottom flaps.

Edward W. Love attended Rutgers University. During his 25 years at Bristol-Myers, he was storeroom keeper, assistant production manager, and production manager before becoming director of machinery research and development. During World War II, he was a War Production Board instructor in its Training in Industry program. As a member of Packaging Institute, Mr. Love has served as vice chairman of the technical coordinating board and as chairman of the production division. He is also a member of American Management Association and Toilet Goods Association.

Don't make the scrapbook too elaborate and don't worry too much about appearance. You will find such a book of considerable value, particularly when you need something special which is a little off the beaten track.

A typical scrapbook set-up might consist of several volumes such as:

Vol. I —Feeding, cleaning equipment
Vol. II —Fillers—Dry
Vol. III —Fillers—Liquid
Vol. IV —Labeling equipment
Vol. V —Case-sealing equipment
Vol. VI —Capping equipment
Vol. VII —Cartoning equipment
Vol. VIII—Tape, metal fastener equipment
Vol. IX —Aerosol equipment
Vol. X —Printing, marking equipment
Vol. XI —Wrapping equipment
Vol. XII —Conveying equipment

Volume III on "Fillers—Liquid" could be set up in sections as:

Section A—Fillers, liquid, constant-level: Equipment for filling liquids into containers by means of straight gravity, pressure-gravity, or vacuum-gravity systems.

Section B—Fillers, liquid, metered-volume: Equipment for filling liquids into containers by measuring a definite amount by volume or time.

Section C—Filler, liquid, metered-weight: Equipment for filling liquids into containers by means of straight vacuum or pressure-vacuum systems.

Section D—Fillers, semi-liquids (viscous products): Equipment for filling non-free-flowing products into containers by means of a positive displacement measuring unit.

Section E—Fillers, tubes: Equipment for filling and sealing collapsible tubes.

Under Section A would be a title sheet listing the companies represented by literature, clippings, etc., on the following pages in that section.

Other sources of information on packaging equipment are the various trade shows, such as the AMA Packaging Show, the PMMI Show, the Canners Show and many more.

The trade organizations to which you or your company belong can also give you help. If they don't have the information at their fingertips, they can generally suggest whom to call to get your answer.

To recap on where to look for packaging equipment, some of the places are:

1. Current machine suppliers;
2. Plant visitations;
3. Trade publications and mailing brochures (scrapbook);
4. Trade shows;
5. Trade organizations.

Special Vs. Standard Machine

It is usually best to stick to standard packaging equipment when it will do the job you want done. The reasons for this (spare parts, change parts, and mechanics' understanding) are the same as discussed previously under where to look for equipment and using current suppliers.

There are, however, exceptions to every rule. Sometimes you have to build a piece of equipment yourself, or have it done by a specialty shop because of a time schedule that can't be met any other way. You may not be able to find the equipment needed either new or old to perform the operation, because it hasn't been made.

Sometimes you'll want a combination of various packaging equipment built or integrated into one unit to meet your special demands. Whether to buy standard equipment or special equipment is a question only the particular circumstances within your plant can answer.

Special machine design is usually very expensive whether you make the design yourself, use a machin-

CUT SHIPPING MATERIAL AND LABOR COSTS

NEW!
BETTER PACK 555 - ELECTRIC

Fastest gummed tape sealer! Feather-touch key feed! 5 operations in 1 second—electrically! Selects, measures, moistens with hot water, cuts and delivers any gummed tape with effortless speed of heavy industrial shipment-sealing equipment...at a fraction of the price. Ask for Proof-Demonstration without obligation.

Better Packages inc. 253 Canal St Shelton, Conn.

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Company_____

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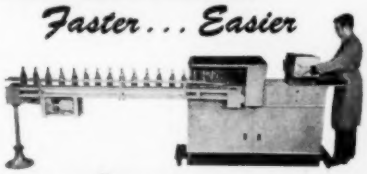
Circle No. 256 on Card

UNSCRAMBLES REGULAR AND ODD SHAPES
Faster... Easier



ISLAND STRAIGHTLINE
UNSCRAMBLER
SPEEDS UP PRODUCTION

• Cartons or cases of bottles, jars, or cans dumped on table are instantly unscrambled and regimented into a single file to keep a continuous flow of units on your production line. Reduces labor costs... minimizes breakage... saves floor space... and meets all sanitary specifications as operator does not handle mouths of units.

ARE YOU CHANGING TO GLASS?

Send for Bulletin ST-1 and learn why there are twice as many ISLAND Styl-O-Matic Unscramblers in use than all other makes combined, and how they are used to unscramble practically every type of container imaginable.

ISLAND EQUIPMENT CORP.
P.O. Box 38-276
Miami 38, Florida

Please send full details on the Styl-O-Matic Unscrambling Tables as described in Bulletin ST-1

NAME_____

ADDRESS_____

CITY_____ STATE_____

How Lord Baltimore helps package 62,000 fish sticks every hour

LORD BALTIMORE'S packaging service extends beyond the creation of high-quality, printed cartons for Gorton's of Gloucester. Here is how our experts increased production efficiency for this volume processor of sea foods.

To meet rising demand, Gorton's looked for a more efficient way to sort and package fish sticks. The installation of our Dex-O-Pak* system was the answer. It unscrambles the product and completes the entire packaging cycle in less than 3 *minutes*.

We offer high-speed packaging systems and cartons for any volume product. Our nationwide engineering program includes installation, regular servicing, operational training and maintenance.

Lord Baltimore's packaging service can increase your production efficiency. For information, write: 425 Park Ave., N. Y. 22, N. Y.; San Mateo, Calif. or 333 N. Michigan Avenue, Chicago, Ill. *T.M.

Lord Baltimore Press

ery supplier, or an engineering specialty firm.

If you do decide to go special, one method you may wish to try with outsiders is to give them a thorough briefing on what you want, then ask them to submit tentative sketches on how they would propose to go about building such a machine. Along with these sketches, they should also submit a dollar figure needed for them to prepare more detailed drawings and arrive at a firm price for the machine in question.

At this point, you can then decide whether they have the feeling of what you are after and whether you want to take the next step. Usually, the sum they request for the preliminary stage is a modest one, but it does give you the advantage of further reviewing the machine in reasonable detail. And it gives the builder an adequate opportunity to come up with accurate figures before you both jump off the deep end.

Who Orders Equipment?

One thought while it is in mind regarding who should purchase packaging equipment. This function should be the direct responsibility of the one who has to answer for its performance, and not a purchasing department that is generally too far removed from the problem and interested mostly in price.

So far, we have discussed what information is needed before we can start looking for equipment and where we might look. Now let's talk a little about how we can decide what equipment we will actually buy. Let's also look at it from the new product standpoint.

Start With A Minimum

If possible, start off with a minimum of equipment and let hands substitute for equipment shortages. Why? Well first of all, no one can predict the future of a product, and to purchase equipment to do the job on a fully automatic basis is not only expensive, but delivery dates frequently make it impossible. More often than not, what looked like the ideal package on the drawing board and in samples and mock-ups, turns up with "bugs." These "bugs" have to be corrected and may require costly changes if equipment is automatic.

For example, perhaps it was agreed by all that an insert or circular would not be necessary, but for reasons not known at the time, it is subsequently found that an insert is necessary. The changes that must then be made to the cartoning machines are generally extensive. The inclusion of a circular could conceivably make an increase in the carton size necessary, so that changes in bundling and case packing are also mandatory.

There is usually an inordinate need for speed in launching a new product, which continues for a period of two or three months; then a lull of two or three months, with a long, gradual pull until real volume is reached. If you can get by with hands, gadgets, and improvisations to meet the first push, you will have the opportunity to discover the "bugs," gain experience, hedge against the "lemons," and come much closer to an efficient production line for the long pull.

Don't Overlook Gadgets

Do not overlook the gadgets in your machine considerations, that is to say the ones which are really worthwhile—the ones you yourself come up with. Two or three thousand dollars to develop a simple piece of equipment without frills may well tide you over the rush and pay for itself in labor savings alone. Indeed the application of such a gadget may make it impossible to justify the cost of the equipment you thought you needed.

Perhaps an orderly way to develop a packaging line begins with a maximum of jigs, fixtures, and gadgets and as many hands as necessary. Then replace the jigs, fixtures, and gadgets and as many hands as possible with semi-automatic equipment. The final step, of

How LORD BALTIMORE's packaging service saves time and money for Gorton's

BEFORE recommending a specific mechanized system, Lord Baltimore's engineering staff surveyed and analyzed Gorton's complete packaging operation. Production called for the immediate packaging of fish sticks as they tumbled from the freezer onto a continuously moving belt. Lord Baltimore's Dex-O-Pak® system was chosen to unscramble and package this jumble of frozen fish sticks.

From chaos to carton

Dex-O-Pak's automatic integrating system quickly aligns the fish sticks into two even rows of 8 sticks each. The rows are then automatically layered and the 16 fish sticks are inserted into a one-piece printed carton. Finally, each carton is closed and sealed by Lord Baltimore's high-speed Thermo-Stik® process. The entire Dex-O-Pak operation takes less than 3 minutes from chaos to sealed carton. A 4-color Fidel-I-Tone® carton that *sells on sight.*

Matched nationwide facilities

Lord Baltimore's folding box plants are located in Baltimore, Md.; Clinton, Iowa and San Leandro, Calif. They are backed by the complete resources of International Paper's mills and research centers. Our matched nationwide facilities and 11 sales offices serve these packaging fields:

Frozen Foods	**Beverages**
Dry Foods	**Pharmaceuticals**
Cosmetics	**Tobacco**
Dairy Products	**and many others**

*T.M.

For longer life and less down time specify Coes Knives on your new original equipment. These knives give you clean, true cuts that mean more production, finer quality and consistent performance.

COES
KNIFE COMPANY
62 COES STREET
WORCESTER, MASS.

course, is the use of fully automatic equipment with a minimum of hands, and to operate the line as fast as possible while still obtaining the best quality and efficiency.

When Do You Go Automatic?

When you should take the step-up from hand operation to semi-automatic operation, then to fully automatic operation is difficult to say. Pure economics may be the deciding factor. The need for volume may make it physically impossible to do by hand. Space available may make fully automatic operation necessary. Company policy as to the ultimate size of its personnel can decide the issue. The desired product-quality level, the quantity and quality of labor available may make the step-up necessary.

These are only some of the things which could affect your decision—each plant will have its own particular problems. It has been said that a semi-automatic line is economical when it can be kept busy 50 per cent of the time, while the fully automatic becomes practical when it is busy 70 per cent of the time.

Consider Flexibility

The actual selection of packaging equipment is much more than a casual undertaking, not subject to specific rules. Many, many things can influence your selection. Here are some more considerations.

You will generally want as much flexibility and adjustability in your equipment as you can get. Such flexibility and adjustability will vary with the type of machine, and can be overdone, if you try to cover from a ¼-oz. bottle to a 5-gal. jug. Too many compromises frequently have to be made in covering too wide a range, and the result is poor performance all the way round.

However, it costs very little more to make provisions for a circular or leaflet on a cartoning machine, so that same can be added at a later date by purchasing the leaflet feeding mechanism. It would appear that this same situation will apply in other types of equipment as well. A word of caution on flexibility and adjustability: Don't try to cover everything from A to Z—it doesn't work! Push your machine supplier, but listen to its engineers as well.

Get Your Mechanics' Ideas

Selection of your packaging equipment should take into consideration the opinions of your operating mechanics with careful study of their recommendations. The best machine available won't give you the production you expect if your mechanics are convinced it's no good before it even arrives. You may actually be better off production-wise with an inferior machine if your operating people are not convinced of the merits of the machine you want to buy.

The decision to buy a particular piece, or pieces, of packaging equipment frequently has to be made on the basis of the physical limitations of the area in which the production line must be installed. For example, one manufacturer's machine may be available with a right-angle delivery only, whereas another supplier's delivers only to the left, and a third supplier's delivers straight through on a return basis.

You may well have to select the straight-through machine since an angle delivery would mean going through a wall, or because an existing production line was in the way. Space available or location in which you must put the line could require a left-to-right flow and, since it is usually desirable to have your line operators all on the same side of the production line, you select the machine that gives you the layout you want.

Many times your equipment selection will be based on the things you have learned or seen on the previously mentioned plant visitations. You may want to go back to that particular plant to review the machine and once again view its operation. Go without the machine supplier and talk to mechan-

ics and operators who are running the machine as well as the person in charge. Making this visit without the supplier is in no way intended as a reflection on its integrity. To the contrary, if you don't have confidence in your supplier, you shouldn't be dealing with its personnel in the first place. The suggestion is made because it is frequently possible to get better and more accurate information without the supplier with you on such trips, and in this way there can be no embarrassment to either party.

On rare occasions, your selection will be very simple—there is only one machine you can use because of product limitations, package limitations, or because there just isn't any other one to be had.

Cost Is Minor Detail at Times

Availability and/or price also play an important part in your final selection. As a matter of fact, price is sometimes the only consideration. Packaging equipment should never be purchased with only its cost in mind. There are times when it has to be done, but it is not right. Within reason, price should be a minor consideration.

Selection of equipment then may be based on:

1. Similar equipment;
2. Adjustability and flexibility;
3. Your mechanical force's opinions;
4. Plant or layout physical conditions;
5. Your opinions from plant visitations or past experience;
6. Product or package limitations;
7. Availability;
8. Price.

Selection of your packaging equipment as you now see is not an exact science. The foregoing is, however, intended to be a guide for use in making your selection easier.

To sum up then:

1. Decide the category of your packaging operation;
2. Determine the product and package specifications;
3. Determine where you will look for equipment;
4. Determine actual selection of equipment;
5. Hope you have made the correct decision. *(End)*

FOUR... ...GOOD REASONS FOR YOU TO USE

jet-pak®

CUSHIONED-INSULATED SHIPPING BAG

1-Low Cost-

...For about three and a half cents each for No. 3 size in 10,000 quantities, JET-PAK is not the cheapest material to buy—but is by far the most inexpensive package to use. JET-PAK cuts packaging time per unit—ready for mailing—to 15 seconds or less. *Compare that with your present method!*

2-High Security-

...Passed sternest drop tests demanded by U. S. Postal Authorities with flying colors. JET-PAK also considered pilferage-proof. Secret is JET-PAK's one continuous, tough, Kraft paper sheet construction—so folded and glue-locked that never less than two thicknesses guard contents at all times plus four thicknesses on end-folds. *Compare that with your present method!*

3-Breakage Proof-

...Cushions contents with millions of tiny, resilient, paper particles. JET-PAK reduces breakage to an irreducible minimum. These same particles, combined with asphalt lamination, erect waterproof thermal barrier against both temperature and humidity. *Compare that with your present method!*

4-Simplicity-

...Completeness as a package so speeds packaging process that even unskilled direct labor time is cut by more than one-half. JET-PAK eliminates waste motion—needs no supplementary materials—makes no mess on the receiving end. Easy to open, JET-PAK discloses all contents—ends losses of small parts due to careless shipping or receiving practices. *Compare that to your present method!*

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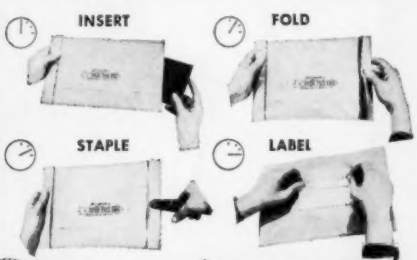
Just clip this coupon to your letterhead and mail to:

FOR SET OF FREE SAMPLES



ROPE COLUMBIAN TWINES

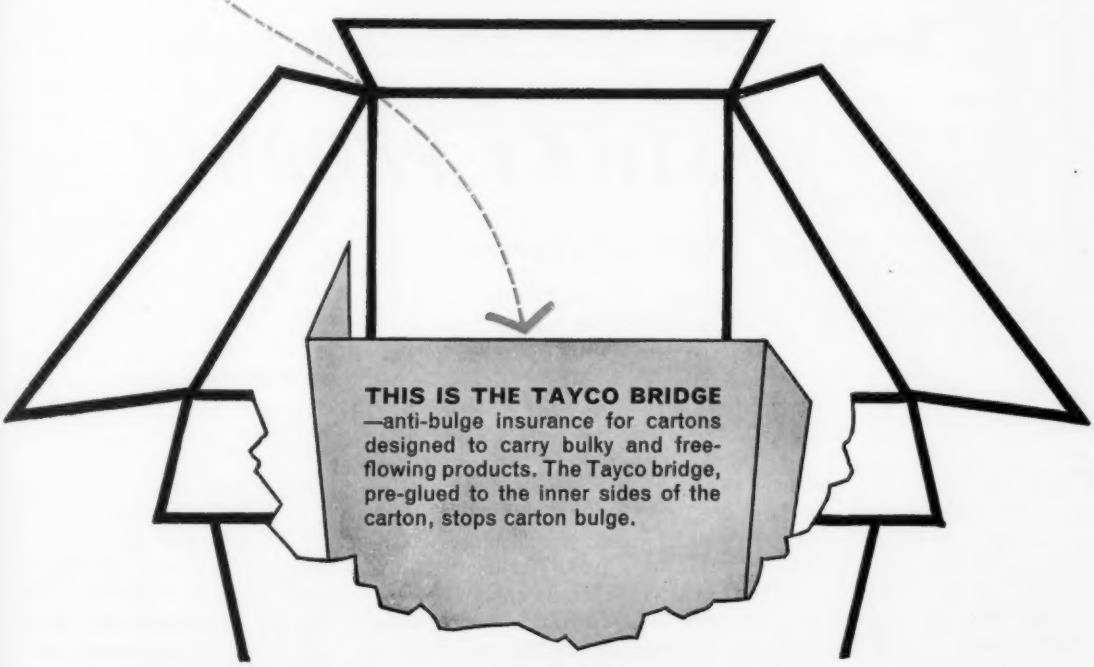
jet-pak
Packaging Division
Columbian Rope Company
Auburn "The Cordage City" N. Y.

"BULGING"
IS FINE
(in a bulldog, that is)
...BUT NOT
IN A
CARTON!

How to prevent carton bulge

with the Tayco bridge

Marathon's Tayco cartons have a hidden inner bridge that does away with "bulldog bulge." With the Tayco bridge, side walls always stay perpendicular; cartons look better, stack straighter, overwrap tighter. Ask your Man from Marathon to tell you how the Tayco principle cuts down on paperboard caliper . . . and final costs. Marathon, A Division of American Can Company, Menasha, Wis. In Canada: Marathon Packages Limited, Toronto 3.



THIS IS THE TAYCO BRIDGE
—anti-bulge insurance for cartons designed to carry bulky and free-flowing products. The Tayco bridge, pre-glued to the inner sides of the carton, stops carton bulge.

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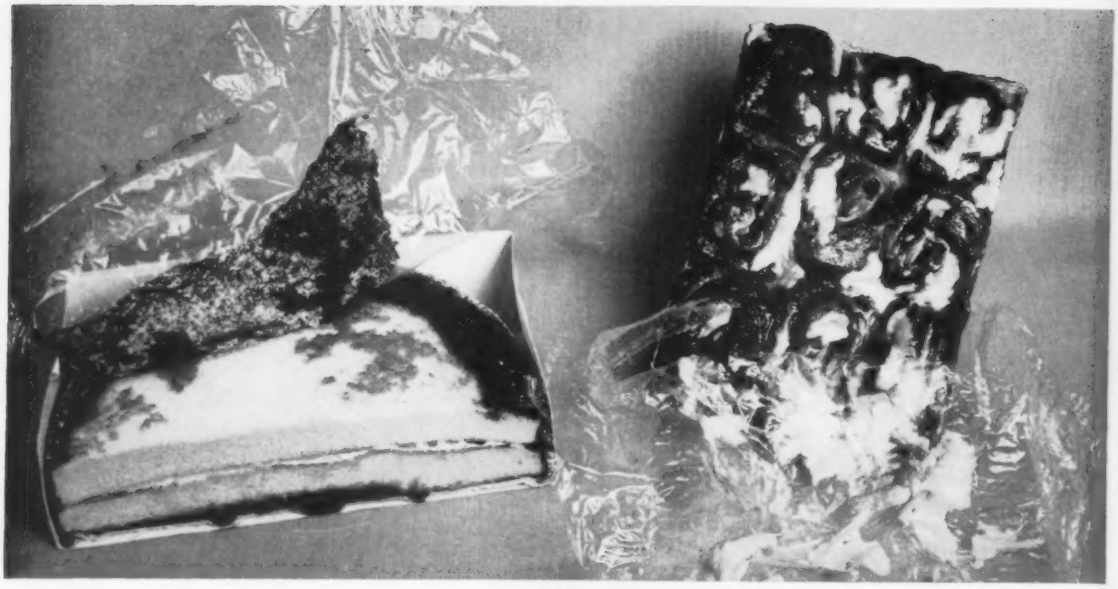

ICINGS CAUSE SPECIAL PROBLEM when they stick to wrapping materials. Sticking is due to their fluffy nature—they have almost no internal strength.

Select the right package for a *STICKY PRODUCT*

Part I—Food products

By William G. Louden,
Director of Product Development,
Paterson Parchment Paper Company,
Bristol, Pennsylvania

Foods and industrial materials are generally not thought of as being sticky or not sticky, but to the packaging engineer the distinction is an important one. The tendency of some products to stick to the wrapper creates problems which sometimes are not easily solved. The truth of the matter is that not very much is known about adhesion, let alone selection of the proper packaging medium for any given sticky product.

Must Make Lab Tests

Unfortunately, the proper selection of a packaging material for such a product can only be decided after thorough laboratory tests. However, the technology of packaging tacky products has advanced to a state where it is possible to predict with some degree of accuracy just what types of packaging mediums will or will not be "in the ball park."

We define satisfactory stripping or "release" characteristics as being accomplished when the packaging material can be removed from the tacky product without seriously disturbing the product, and when the packaging material can be removed in one piece with minimum effort.

What Makes It Stick?

Some of the causes of adhesion are well known. Certainly the na-

STICKY CANDIES can be packaged fairly easily so as to provide quick release from packaging material.

ture of the surface contacting the sticky material is quite important. Ordinary paper, for example, is a mat of fibers which are not too well bonded together. Thus, if the sticky material has any flow characteristics at all, some of the surface fibers are likely to be quickly surrounded. Then, when the packaging material is removed, a layer of "fuzz" often will remain on the tacky product. Frequently, a release problem can be solved by simply covering up this mat of fibers, thus making sure that nothing can be removed.

The next major cause of adhesion, which is also closely related to surface considerations, is the penetration resistance of the packaging material. For example, if a wet vegetable is wrapped in an absorbent paper and then frozen, it will not be possible to remove the wrapper because moisture will have penetrated into the sheet itself and frozen, thus forming an adhesive bond far greater than the strength of the paper itself. Something similar can happen in the case of materials with relatively high oil contents, or high sugar contents. Therefore, in many packaging case histories, high penetration resistance is also an important requirement.

Brittleness, or lack of strength, obviously plays a part in good stripping characteristics. If the packaging material becomes brittle or weak, it will not be possible to remove it readily from the tacky product.

Chemical Treatments

Sometimes, when all of the above characteristics are in line, satisfactory release still isn't obtained because the product is "too sticky," and it is necessary to resort to the use of chemical treatments on the packaging material to reduce its specific adhesion characteristics.

There are quite a number of release treatments that can be used. Two of the most common are: the silicone resins, applied either by emulsion or solvent coating techniques, and stearato chromic chloride. However, the simple application of a release treatment to an ordinary grade of paper often fails to solve many releasing problems. At the same time, intelligent use of chemical treatments combined with some of the other general physical requirements described above, will usually provide one or more satisfactory solutions to most packaging problems.

First, Look At Product

The easiest and most logical approach is to consider the nature of the tacky product itself. Almost without fail, the key to the solution lies in this direction. We believe that, by so doing, it is possible to screen the number of packaging material candidates and thus reduce the laboratory evaluation program to something which is workable and not too cumbersome.

Because of the many special toxicity problems involved, it is practical and convenient to divide the broad class of tacky materials into two main categories. This would be defined as those materials which are foods and those which are not.

FOOD PRODUCTS

Generally speaking, packaging tacky foods is an easier job than packaging tacky industrial products, although there are such considerations as non-toxicity, appearance and consumer appeal, performance on automatic packaging machinery, and printability, which

Many of you have at one time or another probably been up against the problem of packaging a sticky product—a problem not always easily solved. However, packaging know-how has reached the point where it is possible to weed out those packaging materials which most likely are not suitable for a given tacky product, according to Mr. Louden. Explaining some of the known causes of this adhesion, he reviews the current state of packaging experience in this area and discusses the characteristics of some of the more familiar food products which are tacky.

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quite often complicate the food picture.

Foods of moderate or high moisture content:

All of the frozen vegetables fall in the category of foods of moderate or high moisture content. The sticking problem arises from the fact that the liquids in the vegetables can penetrate the carton or the wrapper prior to freezing. When this penetration occurs and freezing then takes place, liquids turn into solids, in this case ice which is an exceptionally good adhesive. In most cases, the sticking problem can be overcome quite easily by simply providing satisfactory barrier resistance to liquid water penetration.

Use Coatings And Liners

This is one of the reasons why frozen food board is wax-impregnated and -coated on the surface. The disadvantage of wax-coated board is that the wax itself tends to flake and come off on the food product to some degree, particularly if there is a fairly lengthy period of time between packing and freezing.

Polyethylene-coated board has also been employed and is an excellent moisture barrier. Polyethylene has the advantage of much greater internal strength and does not pick off on the frozen vegetables when they are removed from the box.

Certain highly colored vegetables, such as spinach and squash, carry rather sizable amounts of moisture and also have pronounced staining characteristics. Cellophane has been used as a liner for the food carton in these cases with success, both from the standpoint of improved releasing properties and improved stain resistance. Specially tested vegetable parchment has also functioned satisfactorily in the packaging of frozen squash and frozen spinach.

But Watch Costs

Cost is an important aspect of packaging. For this reason, waxed food board is the most popular, but polyethylene-coated board has entered the picture. Cellophane and vegetable parchment liners function very well, but operate under some cost disadvantage.

Generally speaking, the use of special release treatments has not

William G. Louden was graduated from Massachusetts Institute of Technology. Prior to joining Paterson Parchment, he was associated with the Plywood and Paper Division of Rohm & Haas Company. At Paterson, he has been director of product development since its inception in 1952 and is also a member of Paterson's board of directors. Mr. Louden has authored several technical articles and is a member of Institute of Food Technologists and Technical Association of the Pulp and Paper Industry.

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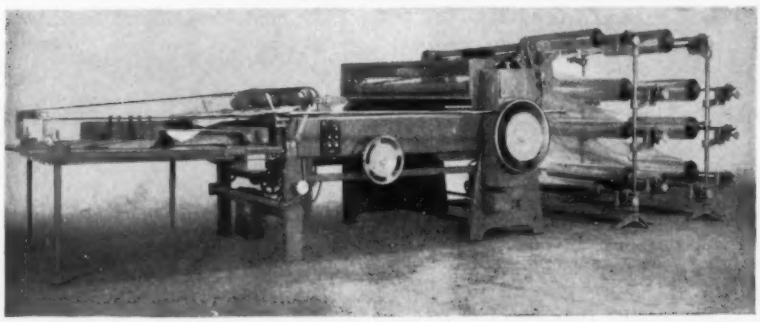

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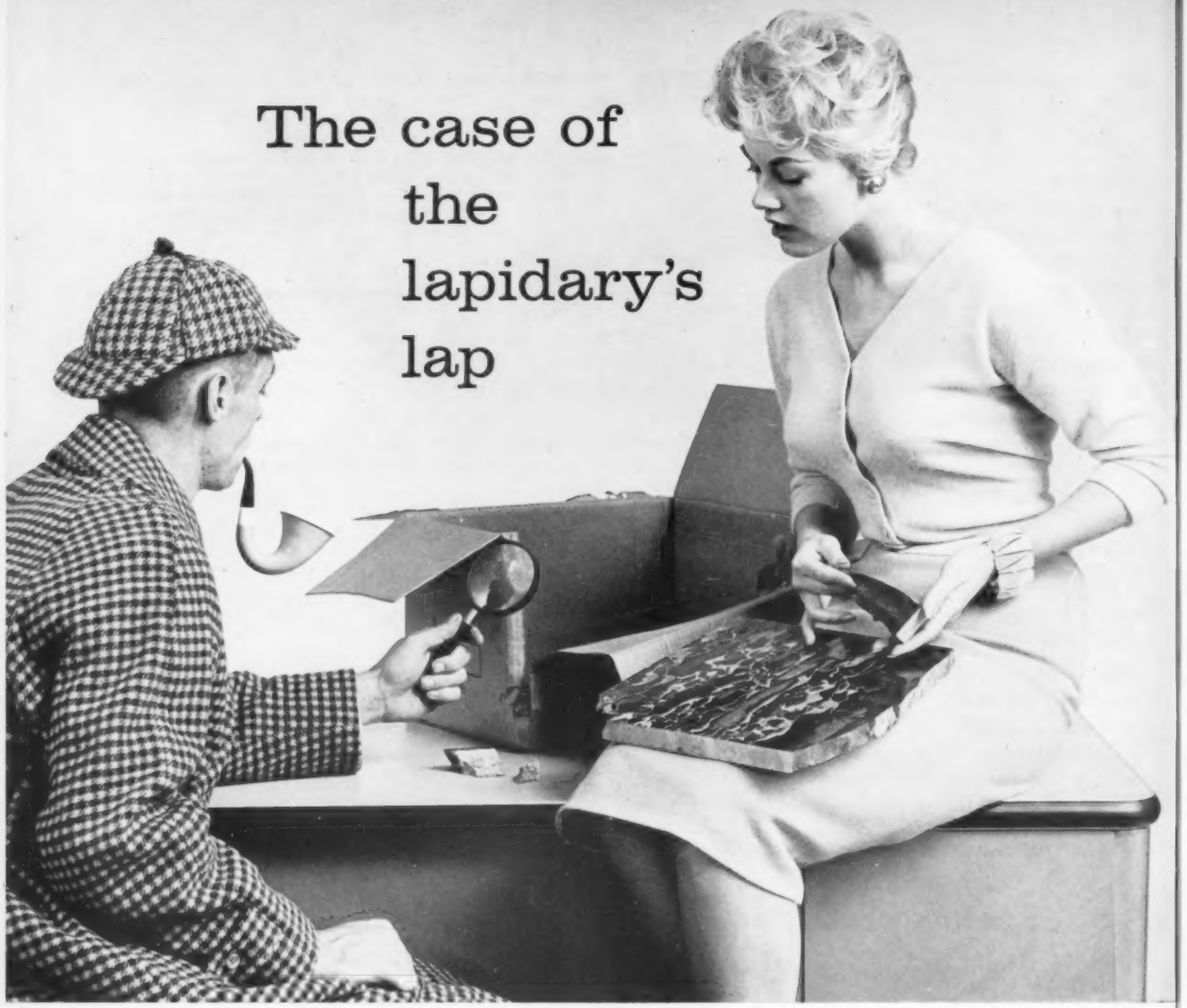
The case of the lapidary's lap



FEARLESS FULLER: What do you know about laps, Miss Watson?

MISS WATSON: Well, I've sat on quite a few.

FEARLESS FULLER: I'm referring to glued laps used on corrugated boxes, not men's laps, Miss Watson.

MISS WATSON: I suppose this has something to do with your latest case.

FEARLESS FULLER: Yes, I call it the case of the lapidary's lap.

MISS WATSON: What's a lapidary, Fearless?

FEARLESS FULLER: He's a person who deals in precious and semi-precious stones.

MISS WATSON: Pray tell, what happened to the lapidary's lap?

FEARLESS FULLER: Well, it seems he was sending some finely-polished agate to a customer and shipped it in this corrugated box.

MISS WATSON: And . . . ?

FEARLESS FULLER: Well, the lap adhesive was not Fuller's and the box came apart at the seams. Naturally the polished agate fell to the floor and ruined the lapidary's work.

MISS WATSON: I imagine he was disenchanted with his box maker after this occurred.

FEARLESS FULLER: He was ready to stone him to death.

MISS WATSON: How did you solve the problem, Fearless?

FEARLESS FULLER: I recommended that the box maker switch to Fuller's Adhesive #565, the finest glued lap adhesive around, and the problem was solved.

MISS WATSON: Oh, Fearless, you're amazing.

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been necessary in the packaging of frozen vegetables. Resistance against moisture penetration is the most important factor.

Foods of high or moderate moisture and fat content:

In considering foods of high or moderate moisture and fat content, the first to come to mind are meat and fish, as well as fats such as butter and oleomargarine. Sticking problems may be encountered with this group of food products, either in frozen form or under normal conditions of refrigeration.

Have No Permanent Tackiness

Meat and fish, as a group of food products, have no permanent tackiness about them. Sticking difficulties generally arise because fats or moisture in the form of meat juices penetrate the packaging medium. Then, under freezing or refrigerating conditions, the fat or moisture becomes hard enough to function as a glue and causes delamination or fiber failure of the packaging material in many cases.

For this class of foods, it is generally necessary that the packaging medium meet the following requirements:

1. Fair-to-good resistance to moisture penetration;
2. Fair-to-good resistance to fat penetration;
3. Good toughness and strength, or quite low specific adhesion to meat products (i.e., chemically release-treated).

Under Refrigeration

Problems associated with refrigerated food products in this category are relatively mild and easily solved. They arise principally in the case of ground meats such as hamburger or sausage, which are wrapped with a single wrapper and where the packager requires that no meat should adhere to the wrapper. There is also a considerable amount of difficulty in the packaging of bacon and link sausage on food board.

Vegetable parchment, greaseproof papers, plastic films, polyethylene-coated krafts, and waxed papers—all generally function quite well in the wrapping of refrigerated meats.

Quite recently, another problem has arisen in the case of whipped margarine. The internal strength of the whipped margarine is so low that the specific adhesion of the wrapper to the food product must be almost zero to prevent transfer of some of the margarine to the wrapper. Sticking problems have also been encountered from time to time in the wrapping of other types of butters and oleomargarines, but almost without exception they can be solved by the use of vegetable parchment wrappers.

Problems With Frozen Meat

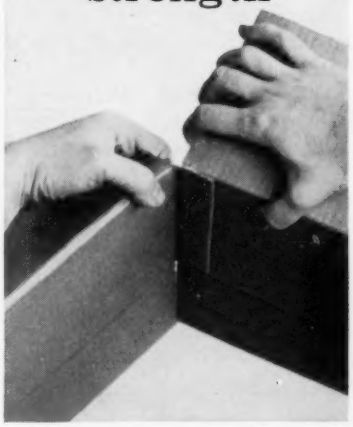
The principal problem arises in the freezing of meat. While complicated in most cases by the presence of considerable quantities of fats, resistance to moisture penetration is still the primary characteristic of this problem.

A number of locker papers can be used for the wrapping of meats to be frozen, and they can be removed readily. Laminations of plastic films to paper, extrusions of polyethylene upon paper, as well as a number of specialized waxed papers function successfully in the locker paper field. Specially treated greaseproof and parchment papers will also strip readily from frozen meats. However, when used as locker papers, these materials suffer from lack of moisture-proofness and inadequate strength characteristics.

One of the most severe sticking problems in food packaging today is encountered in the case of frozen hamburger patties. These are individual patties of hamburger prepared by automatic machinery and interleaved with a single sheet of paper. A sizable number of patties are stacked one on top of the other. The piles of patties are frozen in this condition and then later packed in cartons.

Primary requirement is that it should be possible to remove individual frozen hamburger patties without necessitating thawing of the stack. Effective release action

Fuller's 565 for machinability plus strength



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on two sides of the interleaver is essential. For this reason, unless two sheets of interleaver are used, waxed and coated papers of various types have not proved to be satisfactory. A special type of vegetable parchment with high oil resistance, good resistance to wetting by water, and a chemical release treatment to cut down specific adhesion, has been successful in this type of application. Vegetable parchment makes it possible to remove individual frozen patties readily.

This same type of genuine vegetable parchment has been used successfully as interleavers between layers of frozen pork chops, steaks, lamb chops, and various cuts of frozen fish. By virtue of its complete resistance to either oil or fat penetration, aluminum foil is also a candidate for frozen meat packaging.

Foods of high moisture and sugar content:

Packaging problems of greater difficulty are encountered in foods of high moisture and sugar content. Not only is there a possibility of moisture penetration into the packaging medium, but sugar, by its very nature, is an excellent adhesive. Candied fruits such as dates, figs, cherries, pineapple rings, and candied orange, grapefruit, and lemon peelings are in this category. Crude licorice blocks also present a special packaging problem. In the same area, the introduction of sugar-coated breakfast foods has posed sticking problems.

If Food Can Be Kept Dry

In those cases where the candied fruit can be brought to a fair degree of dryness, tackiness can be controlled. If the fruit is then packaged in a moisture protecting wrapper, such as is usually the case with sugar-coated breakfast foods, the sugar can be kept in a relatively tack-free state, and sticking can be avoided. Unfortunately, the drawback of this approach is that, when the package is opened, the food product can once again become tacky, with resulting difficulties.

For this type of product, quite a number of different packaging mediums have been used with varying degrees of success. Waxed food board is fairly successful as long as the food remains dry. Specially treated types of vegetable parchment, glassine papers, and waxed papers have been used. Polyethylene and cellophane films also have been employed, but again, these are generally used to keep the product dry. Once the product is sticky, neither of the above films is particularly efficient as far as stripping characteristics are concerned.

Vegetable parchment and varnished glassines have been used as carton liners in packaging commercial block licorice. For years, other types of varnished papers have been used in the lids of jelly jars to reduce to some degree the adhesion between the lid of the jar and the jar proper. *(Turn page)*

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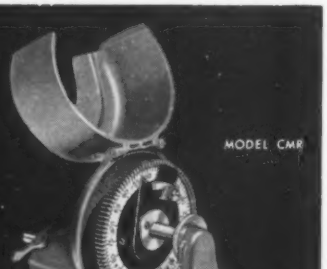

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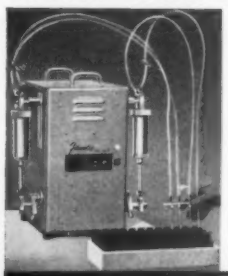

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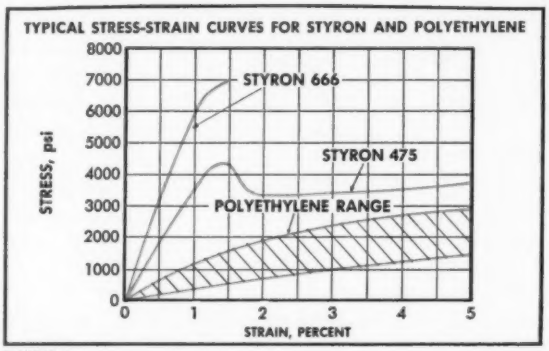

FIGURE 1

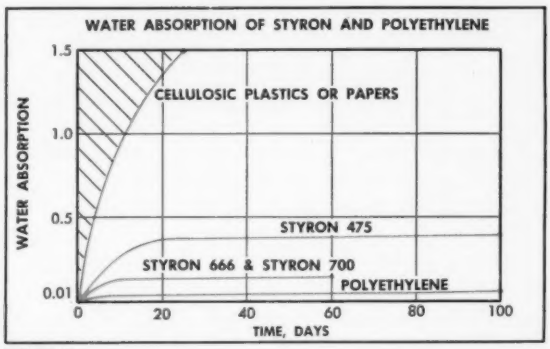

FIGURE 2

Reaching the absolute ideal in a package is often so costly that the engineer is required to settle for only those properties essential to product protection. In attempting to hold down cost, he often decides in favor of materials he knows best even though a better package may be available at less cost.

Polystyrene and polyethylene plastics offer unusual packaging properties when compared with more conventional cellulosic materials. These plastics are particularly stable over a wide range of moisture conditions and with long-term aging. Polystyrene combines this stability with a high modulus to produce rigid, stable containers. Polyethylene in turn combines stability with a lower modulus to offer added toughness.

RIGIDITY – Both the Styron® and polyethylene families have a range of moduli in flexure, making possible a balance between toughness and rigidity in container walls (Figure 1). Because these materials may be readily formed or molded, added rigidity can be obtained at specific points such as corners or lip edges. Most important of all, the rigidity of these materials remains constant even when the package contains a liquid product. Figure 2 shows that Styron and polyethylene absorb little or no moisture which by comparison tends to soften cellulosic materials.

DIMENSIONAL STABILITY – In addition to their extremely low moisture absorption, these plastics will not swell and contain no plasticizers which can cause shrinkage due to their loss upon aging. In addition, Styron has a low creep rate so packages under pressure will not exhibit cold flow which causes package distortion. All of these factors add up to high dimensional stability, a property that translates into vending cups that dispense with ease, meat trays that do not get soggy, containers with snap-on lids that stay sealed and retain shape throughout shelf life.

Dow Plastics Technical Service engineers are working directly with container fabricators as well as end users. Dow's experience in rigid packaging and its facilities for testing are constantly being utilized in package development. Manufacturers and end users of containers are invited to consult with Dow on container problems. Please contact your nearest Dow Sales Office or write to THE DOW CHEMICAL COMPANY, Midland, Mich., Plastics Sales Department 1876DH10.

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Of the various types of packaging mediums available for foods of this category, specially treated vegetable parchments and varnished glassines probably are the most versatile. Specially treated vegetable parchments generally are lower in cost as compared with varnished glassines.

In summation, a packaging material which possesses resistance to moisture and sugar penetration, as well as a low adhesion factor, probably represents the most advantageous solution to packaging problems associated with foods of high sugar content.

Foods of moderate to high moisture, fat, and carbohydrate content:

Foods of moderate to high moisture, fat, and carbohydrate content include: baked foods, candy, cake icings, and frozen baked goods. Packaging problems are particularly severe with this type of product. Therefore, it is safe to say that the packaging materials used should incorporate as many advantageous features as possible. These could be defined as good resistance against fat and moisture penetration, as well as some form of special chemical treatment to minimize specific adhesion associated with carbohydrates in the forms of starches or sugars. A hard, dense, fiber-free surface is a help.

Frozen Baked Goods

One of the toughest packaging problems is frozen baked goods. This is handled at the present time by placing the baked goods in an aluminum pan which serves a double purpose as a good container and baking utensil later on. Naturally, the aluminum foil allows no penetration.

As an added precaution, most of the icing is confined to the top of the pastry. A circle of specially processed vegetable parchment or greaseproof paper, generally in printed form, is placed over the top of the icing, and a regular fibreboard lid fits into the aluminum container. The product is then frozen in this package.

Fluffy Products

Practically everyone has unwrapped a cupcake at one time or another only to have the icing separate from the cake and adhere to the transparent wrapper. Icings present a very special problem because of their fluffy nature—they have almost no internal strength. Consequently, adhesion must be reduced to an absolute zero to prevent this kind of transfer.

Special types of papers and treated films are available which would cope with this problem. Unfortunately, they are not compatible with the heat-seal function which is also usually required. The result at the present time is a compromise of functional properties, which is not too successful.

Dry waxed papers, in the form of fluted cups, have long been used to hold cupcakes, but do not give good release in this type of application. The user must be content to leave a layer of crumbs behind on the paper. Recently, specially treated types of vegetable parchment which help this problem have been developed.

Waxed papers coated on two sides have been used for years with some success in the packaging of various types of caramels and candies. Generally speaking, some of the wax transfers to the food product.

Another development is the lamination of specially treated grades of greaseproof and vegetable parchment papers to food board. This food board is later formed into a tray and used as both the packaging and the baking container for brown-and-serve rolls. With this development, good stripping characteristics have been achieved for the packaging of most types of baked goods.

(In the second part of this two-part article, appearing in next month's issue, Mr. Louden discusses packaging materials for sticky industrial products.)

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PROGRESS IN PLASTICS

PI holds 22nd Annual National Packaging Forum

Packaging Institute is holding its 22nd Annual National Packaging Forum at the Statler-Hilton in New York City, October 31, November 1 and 2, 1960. This year's theme is "Packaging for the 60's."

Monday, October 31st:

10:00 a.m. Annual business meeting followed by *Life* magazine presentation, "Packaging potentials for the 60's."

2:00 p.m. Three concurrent seminars: *Packaging for Self-Service:* Roy D. Connell, J. Wiss & Sons, chairman. Topics: self-service packaging in textiles, hardware and food markets, Thomas E. Cathcart, Jr., Continental Can Co. Inc.; self-service packaging for non-food departments in supermarkets, Edward Korenvaes, Akorn Housewares Corp.; self-service design assignments, Robert G. Neubauer, Robert G. Neubauer Inc. Industrial Designers, and Gerald Stahl, Gerald Stahl Industrial Designers.

Packaging Research and Development: "Research and development—springboard for tomorrow," Paul B. Reuman, Continental Baking Co. Topics: higher education for manpower training and packaging research, H. G. Walter, Packaging Foundation, Inc., Michigan State Univ.; the independent research organization, Peter B. Baker, Arthur D. Little, Inc.; "Planting people and growing ideas," G. T. Schjeldahl, G. T. Schjeldahl Co.; "blue sky" packaging ideas, Ralph F. Hansen, Monsanto Chemical Co.; activities of PI's technical committee, Dr. L. E. Simerl, Olin Mathieson Chemical Corp.

Corrugated and Fibreboard Materials: "Packaging for the 60's," Frank P. Coons, Johnson & Johnson, chairman. Topics: characteristics of paper containers, Charles O. Roth, Jr., West Virginia Pulp and Paper Co.; foil laminated corrugated, Richard G. LaBudde, Aluminum Co. of America; corrugated fibre industry, Allyn C. Beardsell, The Mead Corp.; corrugated board for display, Carl J. Begemann, A.S.R. Products Corp.

Tuesday, November 1st:

9:30 a.m. Three concurrent all-day seminars: *Drug and Pharmaceutical:* morning session, "Unit packaging—a look into the 60's," Hugh Horner, Chas. Pfizer & Co., Inc., chairman, and Charles Spannello, Schering Corp., moderator. Topics: materials, sizes and anticipated mechanical advances in unit packaging, L. I. Volckening, Ivers-Lee Co.; high-speed automatic thermoforming equipment, Louis H. Pfohl, Plaxall, Inc.; display and merchandising potentials, A. R. Cozzolino, The Nevins Co.

Afternoon session: "Exploding use of drug and pharmaceutical plastic bottles in the 60's," Carl B. Burnside, Eli Lilly and Co., chairman, and James L. Eagan, Rexall Drug Co., moderator. Topics: blow molding plastic containers, W. O. Bracken, Hercules Powder Co.; manufacturer's view of integrated organization, Carl F. Massopust, Rexall Drug Co.; plastic bottles on high-speed lines, Anthony Iannacone, Fluid Chemical Co., Inc.; expansion of plastic containers, W. J. Graham, Owens-Illinois Glass Co.

Production Line and Machinery: "Down-to-earth facts—packaging for the 60's," R. Ross Kitchen, Sterling Drug, Inc., chairman. Topics: "Sources of energy, control, and motion of the packaging line," R. C. Berger, General Electric Co., and Hale S. Cadieux, International Basic Economy Corp. "Packaging above and below atmospheric pressure," Morris J. Root, G. Barr & Co., and William J. Rothfuss, W. R. Grace & Co., Cryovac Div.

Afternoon session: "Packaging for the 60's—fancy, from cloud nine," Ira Gottscho, Adolph Gottscho, Inc., chairman. Topics: machinery predictions, Roger L. Putnam, Sr., Packaging Machinery Co.; magnetic tape, punched tape and data processing, W. E. Wood, Processes Research, Inc.; flexible films by 1970, Robert Kelsey, *Modern Packaging;* integrating packaging lines of tomorrow, Leland R. Srigley, Parke-Davis & Co.; mechanical vs. electronic controls, Gene Lakso, The Lakso Co. Inc.

Printing: Ernest A. Green, Interchemical Corp., chairman: morning session (in cooperation with Flexographic Technical Association). Topics: designing for flexographic printing, Carl Fink; printers' view of design for flexographic printing, Sam Rivman, Wrapture, Inc.; design of new printing machinery, Robert Zukerman, Kidder Press Co. Inc.; examples of flexographically-printed material, Douglas E. Tuttle, Interchemical Corp.; litho type process separation, Edwin Wiegand, Yoder Engraving Co.

Afternoon session (in cooperation with Folding Paper Box Association of America). Topics: engravings and platemaking in letterpress, Dr. Marvin Rogers; design for letterpress, Albert Knerr, Container Corp. of America; letterpress printing, Mel Kernan, Packaging Corp. of America; wrap-around plate and letterpress printing, Robert Downey, Marathon Div., American Can Co.

7:30 p.m. Awards dinner. W. B. Tibbets, Union Carbide Plastics Co., chairman.

Wednesday, November 2nd:

9:30 a.m. *Flexible Packaging and Plastics:* Edward G. Penn, Riegel Paper Corp., chairman. Topics: aluminum foil in flexible packaging, Dr. M. A. Miller, Aluminum

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Co. of America; shrinkage characteristics of irradiated polyolefin film, Robert D. Lowry, W. R. Grace & Co., Cryovac Div.; forecasting the success of a packaging material, Orville R. Johnson, Crown Zellerbach Corp., Western-Waxide Div.; polypropylene, Dr. E. T. Severs, AviSun Corp.; engineering considerations of high density polyethylene bottles, Jules Pinsky, Brooks B. Heise, and J. H. Parliman, Plax Corp.

Food: Fred W. Schreiber, Lever Brothers Co., chairman. Topics: aerosol packaging of foods, W. Earl Graham, Clayton Corp.; handling of perishable commodities, Dr. Walter A. Maclinn, The Refrigeration Research Foundation; packages in refrigerated warehouses, Franklin D. Newell, Jr., The Minneapolis Cold Storage; unplanned obsolescence in packaging, Carl D. Schoby, Armour and Co.; packager's view of the Food Additives Amendment, Robert N. Johnson, The Kroger Co.; supplier's view of the FAA, Adolph Miller, Milprint, Inc.

Closures: H. F. Wheaton, American Flange & Manufacturing Co., Inc., chairman. Topics: design features of thermosetting and thermoplastic closures, Nicholas Marchak, Bradley Sun Div., American Can Co.; closure developments and requirements in U. S. and Europe, Pierre Beillier, Saint-Gobain, Inc.; automatic application of closures, Edward L. Kuhn, Consolidated Packaging Machinery Corp.; metal closures, Charles J. Jacobs, W. R. Grace & Co., Dewey and Almy Div.

Petroleum Packaging Committee Open Meeting: L. E. Stuart, Continental Oil Co., chairman. Topics: package trends and designs for lubricating greases, Fred W. Langner, Socony Mobil Oil Co.; traffic sub-committee of PPC, C. H. Ficken, Mobil Oil Co.; small metal packages sub-committee, I. N. Wade, Gulf Oil Corp.; shipping cases sub-committee, K. W. Lenhart, Sinclair Refining Co.; shipping sub-committee, H. F. Kielhorn, Cities Service Oil Co. *(End)*

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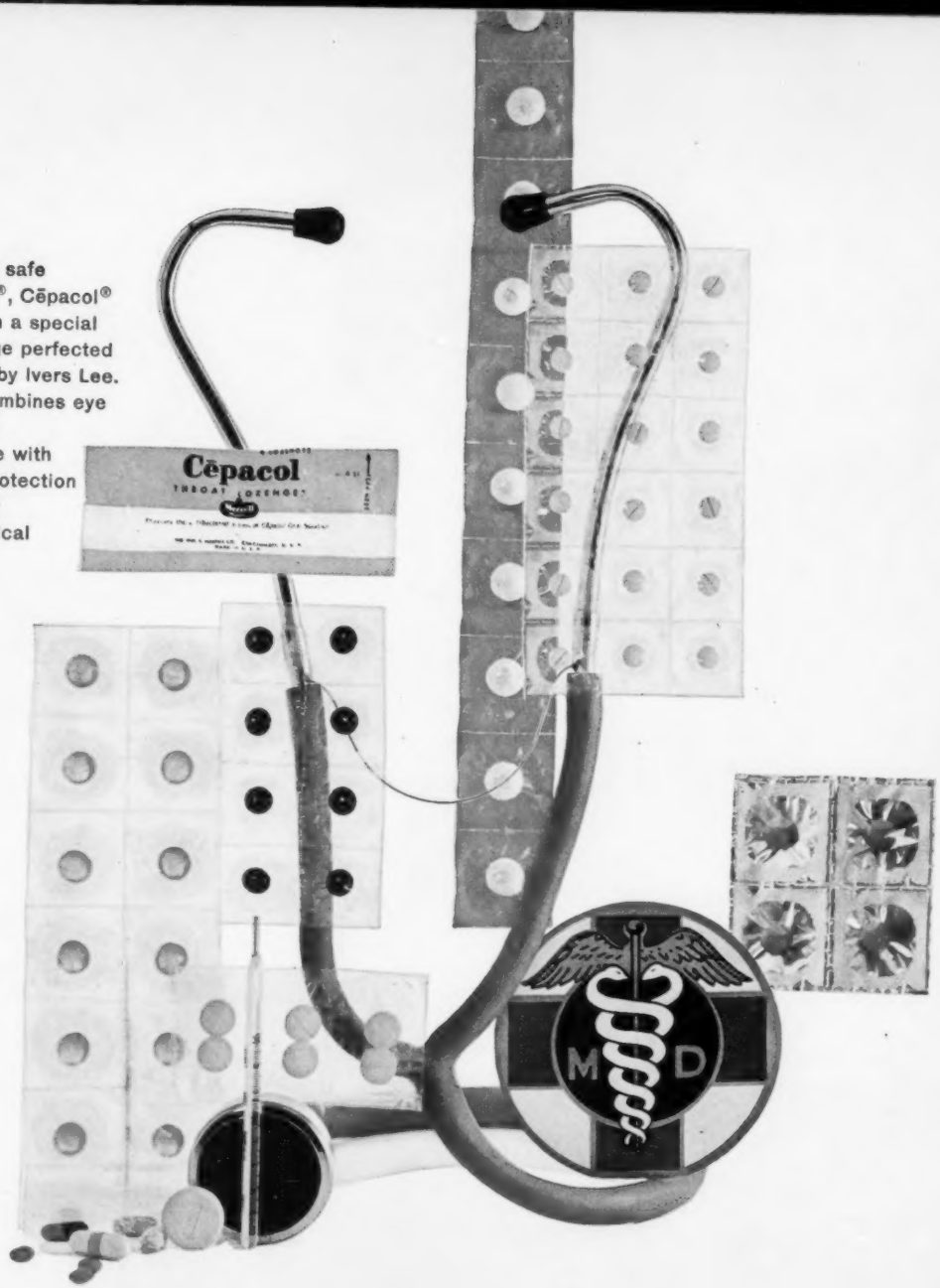

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Part VI—User-supplier relations

Practical pointers to better folding carton performance

No matter how well the package user establishes the technical and operating requirements its cartons must meet, and no matter how articulately purchasing specifications spell out desired performance, continued success in cartoning performance depends on having proper relations with carton manufacturers. In other words, too many users overlook basic matters of *good* communications, thinking the technical problems take precedence.

Build Mutual Confidence

However, the experience of users and suppliers alike indicates that the technical problems usually take care of themselves, once the communications and human relations problems get adequate attention and corrective action. In a nutshell, two words spell out the formula for success in the user's getting and the supplier's furnishing suitable cartons on a continuing basis: mutual confidence.

This term covers a multitude of situations, one of the most basic being the sharing of information. Not enough package users give the carton manufacturer adequate information. In many cases, the user has not delved into its problems deeply enough to know what it wants. With an inadequate definition of the problem, sometimes the most competent supplier representative is unable to help.

Reach The Right People

Also, there have been instances where a carton manufacturer's salesman was not willing to ask the user's purchasing agent whether or not the cartons he was ordering required pre-breaking. Apparently in such cases, the salesman considered the situation extremely sensitive, and he did not wish to jeopardize his volume of business by risking an upset of a delicate relationship.

Such extreme situations merely emphasize that the organizational and human relations difficulties frequently override technical considerations. To an outsider, it seems incredible that a carton manufacturer found it hard to learn whether or not a customer needed pre-breaking, but the facts of business life are such that a salesman simply cannot always contact the right people.

Making Needs Known

An example of the ultimate in *sharing* information and maintaining excellent relations involves a large food company. Before it would buy a single carton from a certain manufacturer (with, incidentally, a reputation for excellence in carton making), its quality control director and other key people concerned with packaging visited the carton plant.

They came not only to discuss their requirements in detail but also to show the carton manufacturer's staff and production people a movie. This film, illustrating the packaging operations and problems, showed just how the food company was using the kind of cartons it expected to buy from this supplier—and the trouble caused in the packaging plant by malfunctioning cartons.

An interesting point is that the package user people insisted also on showing the movie to the men "on the firing line" in the carton plant—including those in the die shop as well as in carton fabrication. The executives from the food company felt the carton maker's people should know just *how* the food company's plants would be using the cartons in question.

Learn The Other's Problems

Other such examples exist in the packaging field. Soap and cosmetic makers, for instance, have gone to similar lengths to make sure the carton production people understood the problems underlying the carton purchasing requirements which spelled out the requisite performance.

Some packaging specialists stress the importance of mutuality and say that both parties should be familiar with each other's operations. Another aspect of this is that each team thus learns the limitations and problems as well as the capabilities of the other. And on high-speed packaging lines the problem or benefit is compounded —thus making more essential than ever the building of *mutual confidence and understanding.*

Bypassing Obstacles

Lest this emphasis on mutual trust and confidence suggest it usually is lacking, the point is worth making that typical users and suppliers alike say both sides usually make a reasonable effort to maintain good relations. Specific stumbling blocks usually lie in the user not wanting to tell the supplier enough. Similarly, users sometimes complain of the carton manu-

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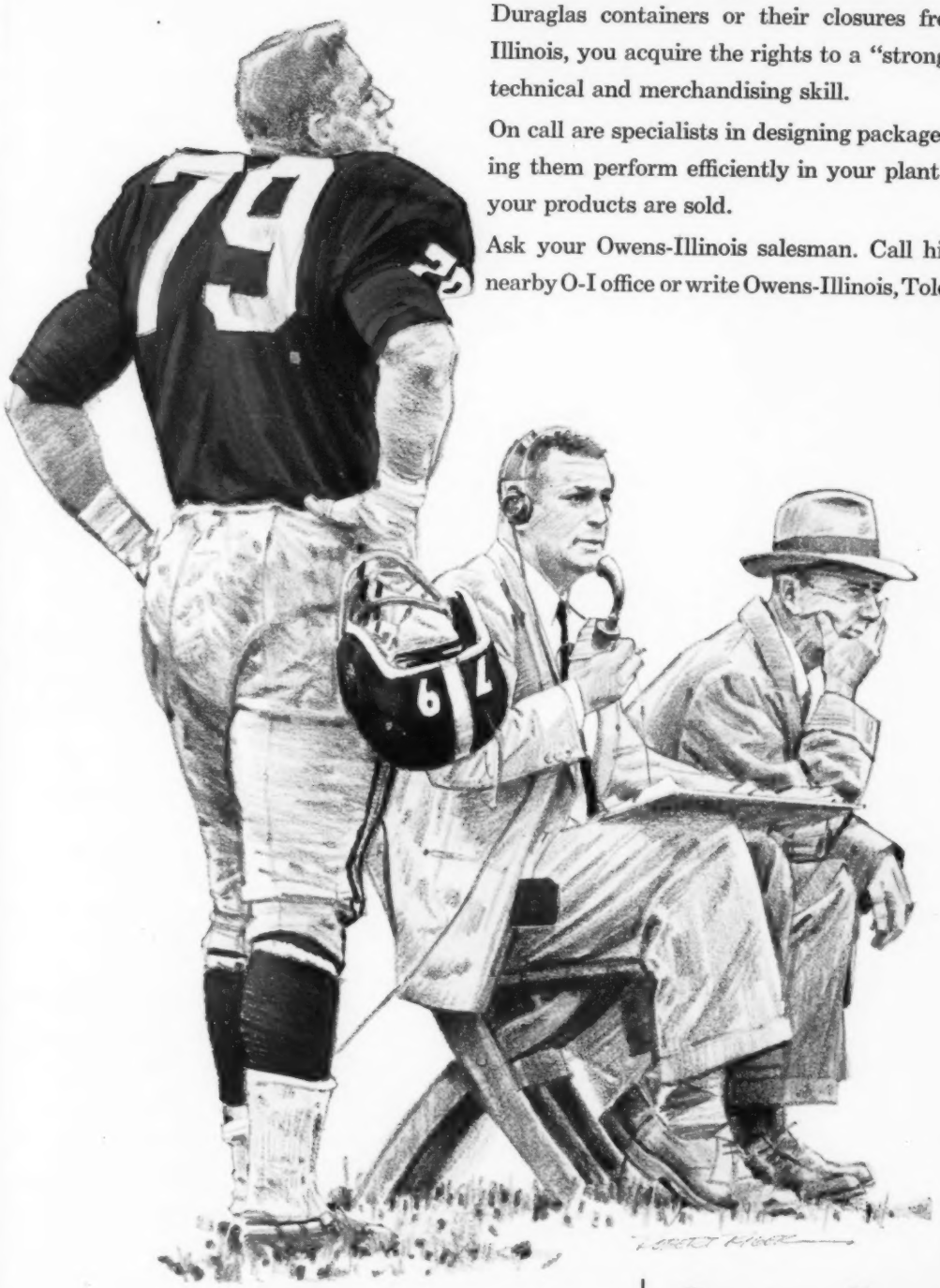

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Labeling Lines

by George L. N. Meyer, Jr.

DESIGN AND THE LABEL

Surely, in this self-service era, everyone is aware of the vital role played by package design. With the average "exposure time per shopper" being a mere eight seconds, the package bears a major part of the selling burden. As a consequence, poor packaging is frequently responsible for poor sales.

In the case of labeling glass and plastic containers (particularly in the bottle field), there are stringent limitations which must be adhered to by the designer. All too often merchandising people get enthused about a certain combination of labels only to discover that they are impractical for machine application at desired line speeds.

Perhaps, the most logical source for avoiding such trouble is one that most people neglect . . . *the machinery builders.* As the world's foremost manufacturer of high speed labeling equipment, Economic Machinery Company has established a complete design service. Regardless of your packaging problem . . . if it involves labeling . . . we hope you will take advantage of this important new aid to better packaging.

THE CONTAINER

First a product . . . then the container! Should your choice be glass, what shape is most convenient or practical for the user? Should it be tapered? . . . bell or wasp-waisted? . . . oval, flat, round or square? Should it have an elongated neck or no neck at all? Will you be able to use a "stock" bottle or must it be customized? In any event, it is imperative that you establish a glass "standard" to which your supplier must adhere. This insures consistent fill level . . . proper labeling position . . . better conveyor feeding and many other essential requisites. Again, EMCO can assist you in establishing these standards.

NEXT . . . THE LABELS

More problems . . . for instance, shape? Number of labels? Position? Type of paper? Tolerance? Grain? Die-cut or guillotine-cut? Perhaps, you will require a spotting lug on the container itself to be sure that the body or shoulder label is always correctly positioned.

Variations in glass or labels can play havoc with a high speed labeling operation no matter how carefully your machine is engineered. With our assistance, labeling standards can be determined which can be used to excellent advantage.

THE GLUE

The glue . . . often regarded as necessary but not important. *A dangerous assumption!* The adhesive must be formulated to operate cleanly and efficiently in the machine. There are four main classes; Dextrins, Jelly Gums, Animal Glues and Caseins. The basic characteristics of each type, the effect of moisture and humidity on the dried film and the final adhesion properties must be considered. Coverage is another important factor. It may be expressed in a number of ways, but dilution, film thickness, machine adjustment and other factors create variations.

These thoughts may seem extremely technical to merchandising people and we agree, they are! However, they are highly pertinent to your cost picture and every product manager or packer must be concerned with packaging cost as much as with package design.

THE MACHINE

EMCO service includes a complete and fair appraisal of your labeling machines. We can often recommend minor improvements to your existing equipment . . . new ways to broaden your capability.

PLASTIC

As with glass, blow mold or other plastic containers present many technical problems on the packaging line. Broad experience in this area enables us to help you from the beginning!

All in all . . . we can be of real assistance. Most important, perhaps, is our ability to set up effective packaging that can be cost controlled! Surely, the cost-per-unit is a vital consideration to every product or merchandising manager.

We'd like to have *your* problem! Specific recommendations can be made in a relatively short time. Won't you let us hear from you?

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facturer letting an unqualified salesman handle an account involving fairly technical performance requirements.

Some package users say that a simple way to solve this is to "get around" an inadequate salesman. In other words, those responsible for seeing that the cartons they buy meet performance requirements try to deal either with strictly technical people or with upper management, rather than with the line sales force or salesman from the carton plant.

Get Word To Management

Sometimes the difficulty is just a matter of misunderstanding. Rather than the salesman being inadequate or unqualified, it may be that he simply does not understand the user's particular requirements. Some users point out that a good remedy for this situation is to have a so-called high-level conference. Here, representatives of the package user can discuss their situation with management people from the carton plant.

In other words, the user knows it cannot deal routinely with carton company management concerning what should be ordinary day-to-day relationships. But, the user does believe in getting the routine relationships off to the right start by letting supplier top management know just what it expects from the salesmen and others who handle the day-to-day details of carton ordering and supplying.

Do We Overrate "Relations"?

On the other hand, some package user specialists feel that most companies make far too much of communications and human relations. There are companies who simply don't get involved in the sort of communication and cooperation that so many other companies feel is essential. One user production official, for instance, thinks he can get good cartons capable of requisite performance without having to work closely with suppliers.

He points to his specifications

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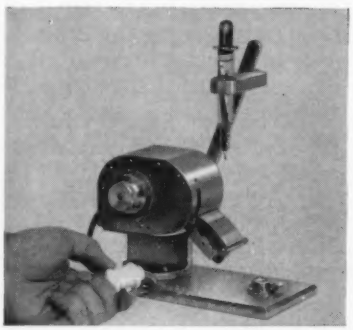

This new machine was developed by T. M. McLaughlin, Jr., of Du Pont Polychemicals Department.

A new machine devised to simply and economically measure the printability of polyethylene film or coated surfaces may also find practical value in determining how well polyethylene will adhere as a coating on other packaging materials.

Here's how the McLaughlin Tilting Platform Tester works: a small sample of film is clamped in a holder in a horizontal position, and a drop of distilled water is placed on the film. An enclosed motor, at the push of a button, tilts the platform at the rate of one degree per second, and is halted when the droplet begins to flow. Then the degree of tilt is read on a scale. This angle is proportional to the forces of attraction between the drop of water and the film. These forces are further related to the degree of polarity and the printability of the material.

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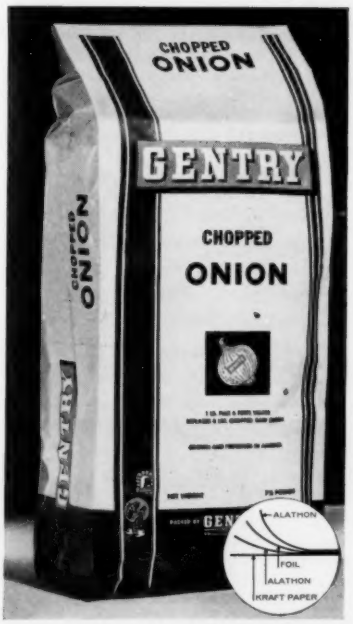

Gentry, a division of Consolidated Foods Corp., Glendale, Calif., markets their dehydrated chopped onions in this newly designed bag.

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which spell out performance as well as material details. This is the sort of "compromise" specification suggested in the previous article in this series.* Apart from having written a good specification, itself an achievement, two points deserve attention:

1. He probably had established better relations than he realizes, since he credits his suppliers with understanding his requirements.
2. American business, like other facets of American life, is vulnerable to fads, and from time to time there is a rash of effort to maintain whatever appeals to management at the moment—whether it be "human relations" or "communications" or "executive development" or anything else. When certain companies announce establishment of programs or departments of one kind or another, other companies feel impelled to do likewise.

Hurdles To Performance

Thinking of this sort sometimes permeates the atmosphere in which package users spell out carton performance and in which carton manufacturers seek to meet that performance. But at the same time, no one should belittle communications and understanding in package procurement; these abstract terms become quite concrete within the context of carton purchasing when problems arise—along with questions of responsibility for inadequacies, i.e., carton failures.

Sometimes a salesman who regards himself as qualified is, in fact, little more than an order taker for cartons. Sometimes there is a personality conflict between the individuals concerned. In other cases, we find users unusually cautious and secretive, relying on their own interpretation of just how much information they should give a supplier.

Develop Proper Atmosphere

All this adds up to an atmosphere in which the exchange of confidence (and know-how, along with know-why) does not flower. Users who have established with carton makers the kind of relations other users would like to have, point out that mutual sharing of information and experience *does* pay dividends.

A serious problem sometimes arises in connection with developments initiated and worked out for particular customers. Users strive to get some special packaging advantage which they wish to retain as confidential for a reasonable period of time. Other users sometimes tempt carton salesmen and development specialists to betray confidences, or at least to share prematurely some development or carton structural or functional attainment.

On the other hand, some users point out that the problems of maintaining lead time and deadlines for packaging developments demand taking the carton maker into one's confidence. Failure to do so means lost time and perhaps loss of a market by failing to get a new package into distribution in time. Balancing this against possible trouble resulting from an oc-

*"Part V—Developing articulate, workable specifications," PACKAGE ENGINEERING, 5 (1960), No. 8 (Aug.), p. 84.

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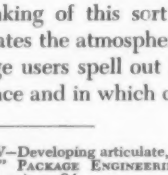
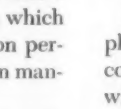
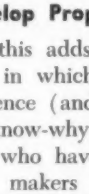

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casional defection by a supplier representative failing to protect a confidence, many users say the risk in favor of meeting schedules by sharing full information is well worth taking.

Machinery Versus Cartons

Other aspects of user-supplier relations involve the triangular relationship of package user-carton manufacturer-machinery builder. Especially during recent years and with the rise of high-speed packaging, this problem has come into focus. It boils down to a matter of *fixing responsibility.*

The "standard" version of this trouble is that the carton manufacturer claims the machinery builder is shifting to it the burden of maintaining unrealistic tolerances. And the machinery producer claims the carton maker does not do a good job of controlling tolerances. Then, when cartons jam on the user's packaging lines, each side blames the other for the trouble.

Solve Problems In Advance

A good way to avoid this is to make sure in advance that both machinery and carton producers understand each other and are working together to meet the user's requirements. An example of putting this into practice is the case of a company which insisted on clearing each detail with both parties in advance.

In other words, as its engineers and production specialists evolved a particular package form, they called in the machine builders, showed them the carton blueprints and details, then asked if their machine could handle the carton at indicated speeds. When the machinery people raised objections or questions, the individuals concerned tackled the problem and reached compromises then and there. Similarly, they showed the machinery details to the carton makers and "heard out" the latter's questions or objections.

In this way, they settled in advance the problems of carton manufacturing versus machinery functioning and worked out mutually acceptable tolerances. All this may seem elementary to companies conditioned to *anticipating* problems. But the fact is that too many companies either take for granted such tolerances and operating and manufacturing conditions—or are not aware of the trouble.

Leave Details To Makers

Perhaps the final word on this is that good relations depend on a user's recognition of the specific points of carton performance it needs. Further, especially among smaller companies, package users not only do not analyze their own needs but do not understand the problems and details of carton manufacture. If they did, they would not try so frequently to tell carton makers how to get certain results.

This means that the user not equipped to specify details of material and construction should concentrate on spelling out performance requirements and trust the carton manufacturer's trained sample makers, die makers, technicians, and production people to turn out a carton that runs well on the user's line.

Good Relations Vital

In summation: No matter how much the user knows about his own or the carton manufacturer's operating conditions and limitations, there just is no substitute for working closely—each with the other. Countless companies *are* solving their problems and are reaching hitherto unattained levels of carton performance by stimulating a full sharing of information and by going to the trouble of understanding what the carton maker can and cannot do. This, in turn, stimulates the carton producer to learn and understand the objectives of the user. Company after company is applying these techniques successfully, under conditions of production urgency—to meet today's deadlines of packaging performance. *(End)*

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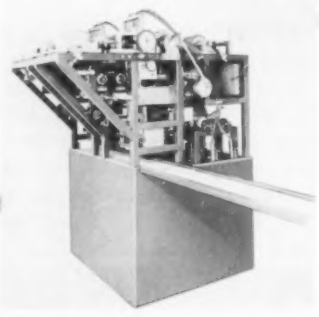


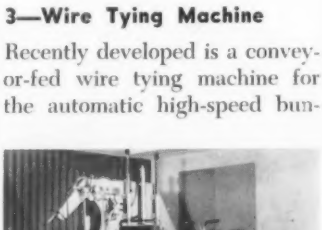
pouch-type containers for liquids, creams, and pastes. Packages may be formed from roll stock of cellophane, foil, Pliofilm, polyethylene, or laminated combinations. Package sizes range from 1 to 12 in. in length and ¼ to 8½ in. in width. Combinations of single or cluster packages within this range can be produced. Unit is available in single or double operating stations with variable speeds of 15 to 36 strokes/min. and capacities of from 120 to 288 packages/min. The filling machine may also be adapted for the packaging of dry materials. For more information write: Speedway Machine & Tool Co., Inc., Dept. PE, 1802 N. Luett St., Indianapolis 22, Ind., or *circle number on card.*

2—Flexible Styrene Film

A new flexible plastic film, manufactured from Styrene foam, has the appearance and feel of kidskin. The developers say it is waterproof, sanitary, lightweight, non-abrasive, and grease-resistant, in addition to having good insulating and cushioning properties. Accepted for food packages by FDA, Santofome is available in thicknesses from 0.01 to 0.03 in. and in rolls 36 in. wide and up to 7,000 ft. long. As a film or laminate, the material is suitable for frozen food packages, wrappings and liners for fragile or highly polished products and components, and for containers where thermal insulation is desirable. For uses where high tear strength is required, material may be bonded to paper or other flexible materials. For more information write: Monsanto Chemical Co., Plastics Div., Dept. PE, Monsanto Ave., Springfield 2, Mass., or *circle number on card.*

3—Wire Tying Machine

Recently developed is a conveyor-fed wire tying machine for the automatic high-speed bun-



dling of newspapers, catalogs, and the like and for the reinforcing and closure of corrugated cartons and wooden boxes. Model 3001 Autobinder uses 13- to 18-gauge round steel strapping and can make up to 26 ties/min. with a 3½-twist tie. It will handle packages from 2 to 23 in. high and 8 to 36½ in. wide. For more information write: A. J. Gerrard & Co., Dept. PE, 400 E. Touhy Ave., Des Plaines, Ill., or *circle number on card.*

4—Polypropylene Jars

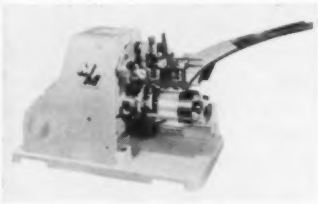
A double-walled polypropylene jar has been developed for use in the cream packaging indus-

try. The double-wall construction seals in a protective shield of air between the inner and outer walls of the jar. Jars may be moulded to match the dimensions and capacities of standard flint and opal jars yet are 5 times lighter than flint and lighter still than opal jars, thereby reducing shipping costs, according to the maker. A variety of colors are available and decorating is applied through a hot-stamp process. For more information write: IMCO Container Corp., Dept.

PE, 750 Cleveland Ave., Kansas City 30, Mo., or *circle number on card.*

5—Tapered Tube Imprinter

A machine has been developed for imprinting tapered objects of plastic, metal, and glass. The



unit features automatic feeding, imprinting, and ejection and marks at speeds up to 100 containers/min. Objects up to 2¾ in. in diameter can be handled. Short-run marking is made practical by the flexibility of the machine in adjusting to objects of various sizes and the use of quick-change type inserts, according to the manufacturer. For more information write: Markem Machine Co., Dept. PE, 150 Congress St., Keene 35, N.H., or *circle number on card.*

6—Platform Scales

Series 9600 general-purpose, portable platform scales are available in two capacities—500 lb. with 8 oz. graduations and 1000 lb. with 1 lb. graduations. A dial chart has a 20-in. diameter reading line. Dials reading in kilos are also available. Weighing speeds may be controlled over a wide range with an adjustable hydraulic damper which brings the indicator to rest quickly and accurately, the maker says. The platform measures 18x27 in. and is elevated 8¼ in. above the floor with an overall height of 71½ in. For more information write: The Exact Weight Scale Co., Dept. PE, 912 W. Fifth Ave., Columbus 8, Ohio, or *circle number on card.*

7—Paper Coating

A new varnish coating for paper has been introduced. Pyroxcote No. 50-25 is a catalized varnish coating which features unusual stability during the coating process, according to the manufacturer. The material is suggested for use on both sheet and web coating machines, especially where the operation exposes the coating material to unusual temperatures, humidity, or oxidation. Generally applied to printed lithograph paper in sheet form, the varnish imparts high gloss and resistance to abrasion for such items as phonograph albums, labels, tags, etc. For more information write: Pyroxylin Products, Inc., Dept. PE, 4851 S. St. Louis Ave., Chicago 32, Ill., or *circle number on card.*

8—Film For Freezing

A cast polyethylene film specifically tailored to package free-flowing frozen food items has been introduced. Possessing improved cold-storage strength, the new film, Kordite 300-F, eliminates packaging tears due to low-temperature brittleness, the producer states. Water vapor transmission rate is sufficiently low to insure protection of food products. The manufacturer says the film has demonstrated superior heat-sealing qualities due to gauge uniformity which also permits improved machineability. The film is available in a standard thickness of 0.003 in., but tailored gauges may also be had. It is offered in widths from 6 in. to 40 ft. in roll form. For more information write: The Kordite Co., Div. of National Distillers & Chemical Corp., Dept. PE, Macedon, N.Y., or *circle number on card.*

9—Padded Bags

Jiffy padded shipping bags are now available in 14 stock sizes ranging from 4x8 in. to 14½x20 in. The one-piece bags are constructed of an outside stretchable kraft pouch, a sealed-in layer of macerated paper pad-

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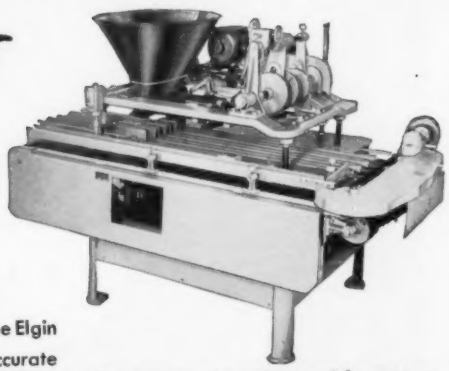

Ideal for glass or tin containers, the Elgin "Quad" is the highspeed, accurate producer—easily and quickly adjusted for fill, and speed! The piston stroke which governs fill in all 4 valves is easily controlled by a single micrometer screw adjusting handle. The upper table assembly is quickly adapted to all container heights by a single hand wheel.

You reduce air pockets and foam to an absolute minimum with the Elgin "Quad" bottom fill. The "Quad" is a proven success with light or heavy packs—is easy to clean—and earns its versatile way with trouble-free deliveries.

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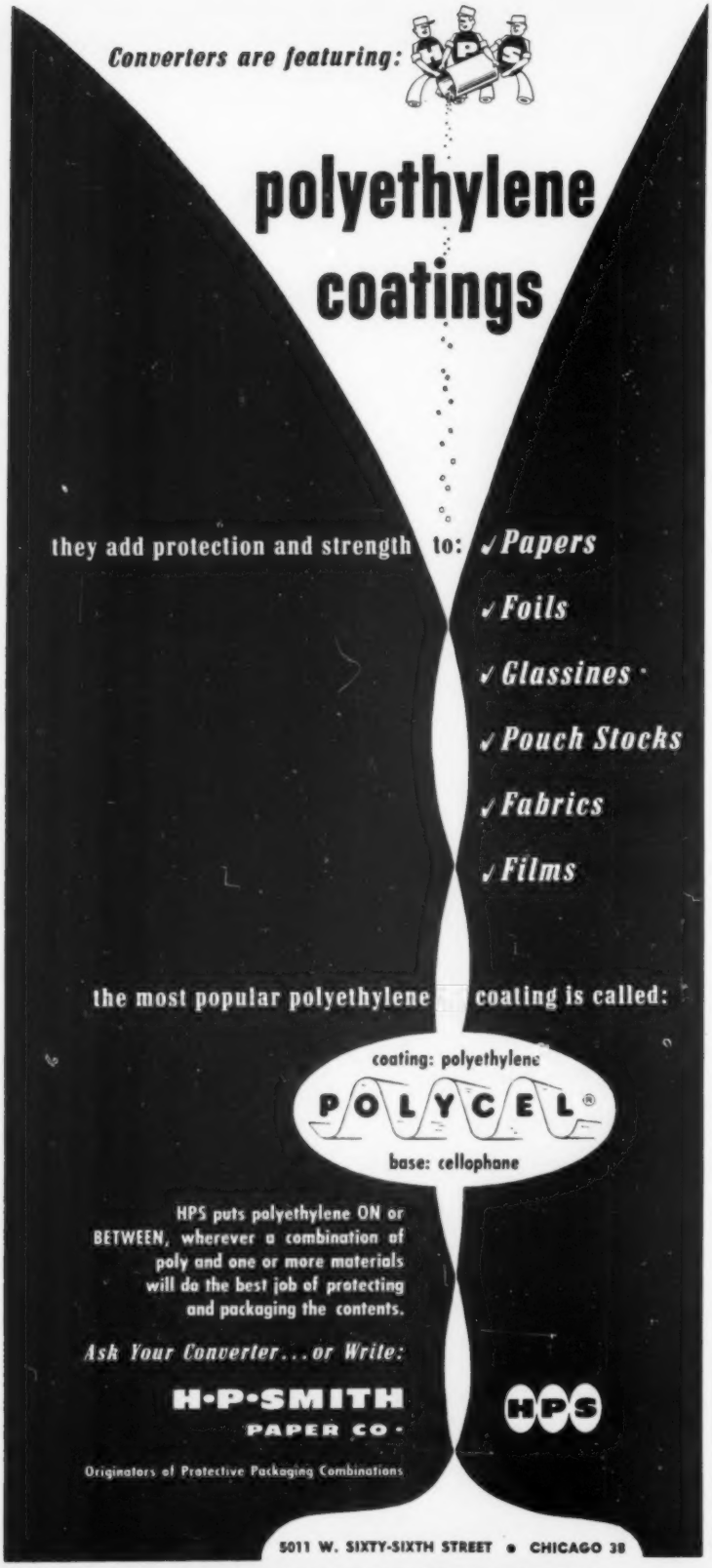
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ding, and an inside liner of kraft. A new feature is a tear-tape closure. In addition to its shock absorbing qualities, the bag also provides thermal insulation. The bags may be used to ship such things as books and other semi-fragile items without additional outside wrapping and they may also be used as an interior package for very fragile items. For more information write: Jiffy Mfg. Co., Dept. PE, 360 Florence Ave., Hillside, N.J., or *circle number on card.*

10—Stenciling Kit

The Touch Stenciling marking kit is now available in 12 sizes. The kit includes a Web-O-Print Handprinter with metal stand, 25 stencils, a 4-oz. bottle of fade-proof, waterproof ink (enough for 30,000 impressions), a stylus, and complete illustrated instructions for addressing and marking for shipment directly on the shipping containers. Printing capacities of the stencil kit handprinters range from ⅞x2¾ in. to 3x7 in. Cartons, boxes, crates, tags, and labels may be marked with the kit. For more information write: Weber Marking Systems, Inc., Dept. PE, Weber Industrial Park, Mt. Prospect, Ill., or *circle number on card.*

11—Test Cabinet

Production of a reach-in environmental cabinet designed specifically for industrial testing has been announced. The two temperature ranges available are 40° to 140°F. and room temperature to 140°F. The unit provides 60 sq.ft. of shelf area on the five shelves and requires 15 sq.ft. of floor space. Features include aluminum interior, fluorescent lighting, dual thermostats, double glass doors, adjustable shelving, and no internal ducts or louvres. The five shelves measure 6x2 ft. For more information write: Labline, Inc., Dept. PE, 3070-82 W. Grand Ave., Chicago 22, Ill., or *circle number on card.* *(Next page)*

12—Clay-Coated Paper

A new type of clay-coated kraft paper is being utilized for making paper bags with capacities of from 1 lb. up to 50 lb. The sheet, called Snow White, is produced on an air-knife coating machine which makes possible exacting quality control of the clay application to the sheet, according to the maker. The chief advantages of this coated paper, they claim, are excellent printability, its greater strength, and its extra brightness and gloss. The air-knife coating method employed does a better job of filling the natural porousness of paper and reduces the inclination of the paper to absorb inks, says the producer. In addition to letter-press, other methods of printing may be used, including flexographic reproduction. For more information write: Arkell and Smiths, Dept. PE, 500 Fifth Ave., New York 36, N.Y., or *circle number on card.*

13—Compression Tester

A new compression testing machine features an integral recorder which automatically plots pressure and package deflection on a graph chart for a permanent record of each test. Platen height may be adjusted to permit changeover from maximum loading for large containers to minimum settings quickly and makes unit particularly suited for large-volume tests or sample testing on containers of varying sizes. Height adjustments are made in increments of 2 in. and the platen can be locked parallel to platform surface or pivoted to conform to the plane of the container top. The recorder plots compression on the vertical axis and deflection on the horizontal axis. Machine base plate is approximately 42 sq. in., maximum travel distance of platform is 6 in., and compression speed is continuously adjustable while running between ½ to 1.5 in./min.

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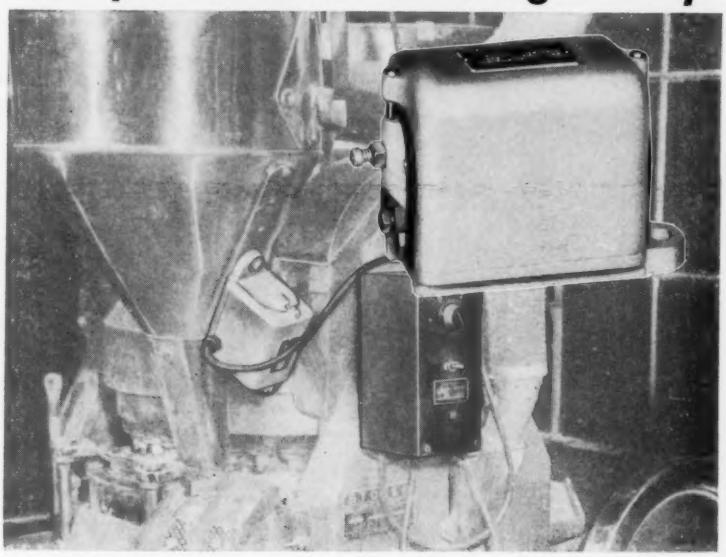

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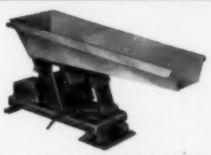

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Unit is available with 3 standard compression ratings: 2,000, 5,000 or 10,000 lb. and 3 height load openings: 48, 60, or 72 in. For more information write: L.A.B. Corp., Dept. PE, P.O. Box 278, Skaneateles 5, N.Y., or *circle number on card.*

14—Plastic Cushioning

Zylex 6 is a new type of plastic cushioning material. Made from transparent plastic, a sheet of the material is thermoformed into a honeycomb of hollow cylindrical blisters. The blisters are raised from the base sheet at two different heights (about ¼ and ⅜ in.) and the lower blister has a smaller circumference. There are 1,000 of these bubbles or cylinders per sq. ft., each one acting as an independent, resilient spring cushion. The non-cellular material is dustproof; non-corrosive; non-abrasive; will not absorb moisture; performs over a temperature range of -80° to +215°F.; has a tensile strength of 28.5 lb./sq. in.; and is chemically resistant to acids, alkalies, and organic solvents, according to the manufacturer. The material has a compression set of 8.1 per cent and can be heat sealed to form special shapes or glued to paper products for custom fabrication. For more information write: Preservation Packaging, Inc., Dept. PE, 1407 Chestnut Ave., Hillside, N.J., or *circle number on card.*

15—Blister Air Press

An automatic air press for mass production of blister packages using the new stik-on process has recently been developed. According to the manufacturer, the high-speed machine will blister package practically any type, size, and shape of product. Heat is completely eliminated from the sealing process and the unit also features a reduction in the pressure required to operate the machine. Operating without heat, the air press cannot curl, warp, or bend the backing card or harm the item being packaged, the maker says. By running on 5 to 10 lb. of pressure instead of the usual 80 to 100 lb. of pressure, the machine will safely package delicate and sensitive parts or products. The stik-on blister package is a hand-applied sealing process developed by Jackmeyer. The air press is geared to produce one complete seal/sec. For more information write: The Jackmeyer Corp., Dept. PE, 253 W. 26th St., New York 1, N.Y., or *circle number on card.*

16—Snap Bag Closure

A reuseable fastener for plastic bags has been developed. Made of polyethylene, the Schumm clip provides an air-tight closure and allows the consumer to remove a portion of the bag contents and reclose the bag or use the clip to close other bags. Four different sizes and a variety of colors are available. A special pincers has been designed for production line use. For more information write: The Ashley Co., Dept. PE, 9917 Ashley Place, Oklahoma City 20, Okla., or *circle number on card.*

17—Wirebound Box

A new type of shipping container for frozen turkeys is being introduced by the Wirebound Box Industry. The developers report that it overcomes the weaknesses of conventional frozen turkey containers and allows safe, high stacking under high-humidity conditions. Called the Wirebound T Box, it is actually two containers in one: an open top corrugated tray and a separate 4-section wirebound wooden wrap-around with a corrugated panel prestitched to one section. The new package is adaptable to blast-freeze and liquid-freeze operations, and present handling practices. Five standard sizes have been developed and there is a modification available in the corrugated tray to fit operations where the practice is to

FASTEST PACKING FOR BAKERY PRODUCTS

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AUTOMATIC CARTONER

- *Handles delicate pies and cakes at speeds up to 70 per minute.*
- *Changeover from one size to another takes only twenty minutes.*

Here at relatively low cost is the perfect combination of speed and flexibility. With the product inserted manually, the Ceco Model 40 handles a glue seal end carton fully automatically from hoppering through sealing.

The Model 40 can also be had to handle heavy weight board or corrugated as well as tuck style, lock style or, a carton having one glue end and one tuck end. It is ideal for bagged products, bakery products, frozen foods, drug products, hardware, etc. For full details write for a 40 Brochure.

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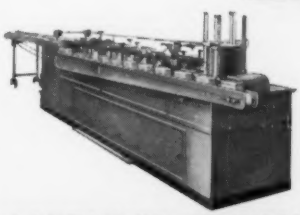

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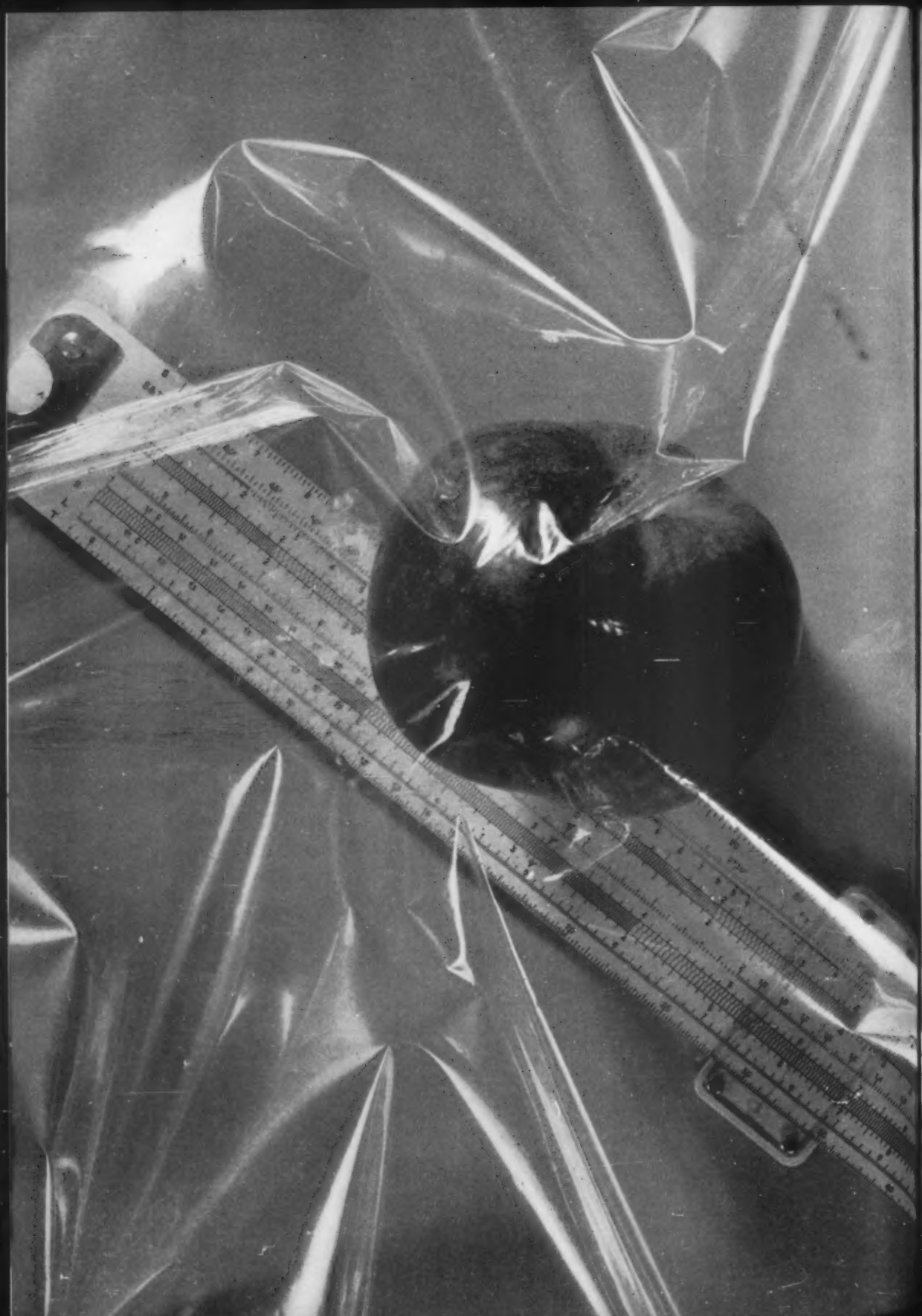

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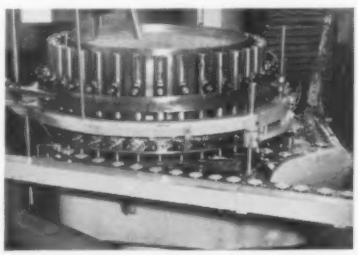

Underwood Deviled Ham is filled at a rate of over 500 cpm, using this Pfaudler 35-station rotary piston filler.

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blast freeze the birds while palletized in the bottom half of a box. During laboratory testing, the container withstood over 110 per cent more drops or falls, on the average, than conventional cartons of the same size. In stacking tests, it withstood 9400 lb. of overhead pressure and after 72 hr. at 90 per cent R.H., the container withstood 6910 lb. of overhead pressure. For more information write: Package Research Laboratory, Dept. PE, 21 Pine St., Rockaway, N.J., or *circle number on card.*

18—Paper-Plastic Container

The availability of a new type of miniature container for sampling or small-quantity sales of dry granular materials has been announced. The package is designed to dispense small amounts of such products as sulfa powders, dietetic salt, cleaning powders, or similar free-flowing materials through a reclosable shaker top. The Clypak container consists of a foil, plastic, or paper-lined tube with a shaker top of molded polyethylene. A captive lid is specially designed to snap shut, forming a positive seal which will not allow the contents to sift or spill. The bottom of the package is a plastic insert. For more information write: Leedpak Inc., Dept. PE, 24 W. 58th St., New York 19, N.Y., or *circle number on card.*

19—Aerosol Filler

A recently developed line of pressure filling equipment has been designed primarily for laboratory use, but the manually operated unit is also adaptable for short-run and custom filling in the cosmetic, drug, and paint industries. Pressure Pak filling unit Model 1000-M includes automatically controlled filler; crimper for both cans and bottles, ranging from 1 to 80 oz. in size; and a combination fluorocarbon and nitrogen gasser. Drip, foam, powder, stream,

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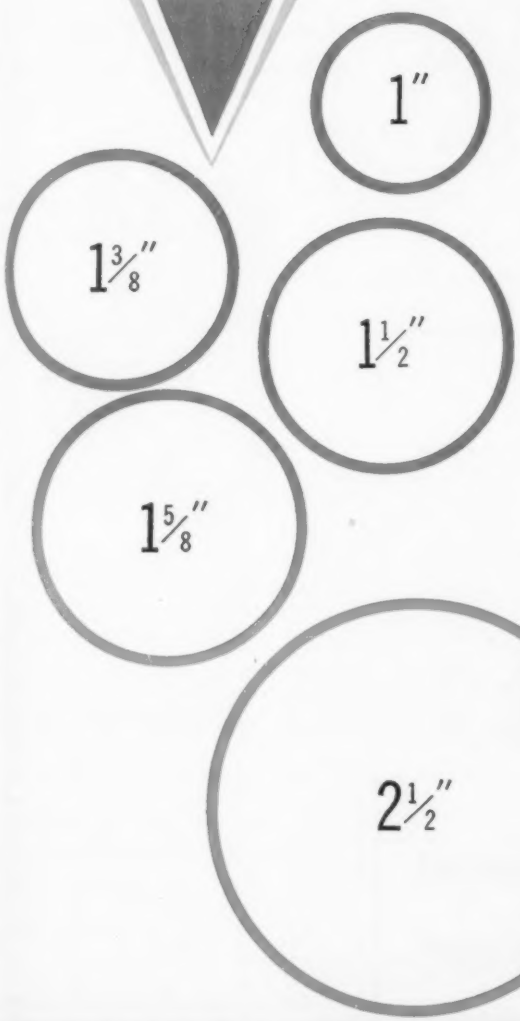

In addition to flexible vials ranging in diameter from 5/16" to 7/8", Clearsite now offers a line of large diameter flexible vials with shell closures. Pick up your product, place it over any of the circles on this page and you'll know immediately whether you can go Clearsite. Chances are you can because these thin wall extruded vials make the ideal package for countless items. Forget the length! Whether you need an inch, a foot or a yard, the body of the extruded container can be cut to your exact requirements.

- Clearsite is a thin wall, flexible extruded vial . . . is crystal clear . . . will not crack or tear . . . has no seams . . . reinforced bottom. Comes in any length and can be multi-color printed.
- Clearsite flexible containers are used to package small electrical and mechanical parts; irregularly shaped items for display and orderly shelf storage; for many pharmaceuticals and cosmetics; name the product—you'll find Clearsite has the package.

For complete information write DEPT. 551.

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spray, mist, and metered valves may be used. To supplement the basic controls, pressure-vacuum testers, leak test equipment, propellant racks, etc. are available. For more information write: Pressure Pak, Inc., Dept. PE, 420 Monceaux Rd., West Palm Beach, Fla., or *circle number on card.*

20—Styrene Paper Laminate

Packaging material in which a flexible sheet of foam styrene is bonded to a flexible sheet of paper or other material has recently been developed. The maker says the combination provides a material which is waterproof, greaseproof, has a high thermal insulation factor, is chemically inert, and non-abrasive. The polystyrene foam assumes additional strength when laminated to paper. It gains the inherent strength of the paper, according to the developer, and the paper can be manufactured in a wide variety of weights, strengths, and treatments. Applications for the foam laminate include bags, paper plates and cups, corrugated boxes, folding cartons, packaging materials for the food industry, and others. For more information write: St. Regis Paper Co., Dept. PE, 150 E. 42nd St., New York 17, N.Y., or *circle number on card.*

21—Hopper/Elevator

The new Elevator Hopper is a standardized, general-purpose hopper equipped with a standard adjustable track with either an escapement mechanism or a transfer mechanism to discharge cylindrical objects in a rolling position. The track is adjustable for a variety of sizes and shapes and no changeover parts are required. Other features include a rotary brush at the top of the elevator to prevent parts from carrying over and a joggling action in the hopper to prevent parts from bridging and to make the hopper self-emptying. Some of the items that may be oriented, fed, or counted with the elevator hopper include paper tubing, metal tubes, cylindrical objects, plastic vials, collars, bottle caps, and hardware. The hopper has a storage capacity of approximately 10 cu. ft. An adjustable escapement can be provided to release one or more parts at a time or the track can be fitted with a transfer device to change the direction of motion. For more information write: Count-O-Matic, Inc., Div. of U.S. Engineering Co., Dept. PE, 40-24 22nd St., Long Island City 1, N.Y., or *circle number on card.*

22—Hand Grip Puncher

The Hand-Hole Punch converts paperboard or corrugated cartons into "carryalls" with convenient hand grips punched in seconds with the new hand-operated punch press. The portable tool is constructed of a new aluminum alloy. According to the company, the punch improves handling efficiency by its ability to be operated at the sides of opened, but filled, cartons. The hand grips punched by the tool are 4 in. long by 1 in. wide with rounded corners. For more information write: York Ideal Mfg. Co., Inc., Dept. PE, York, Pa., or *circle number on card.*

23—Carton Former/Stitcher

A new box machine features air-driven stitching heads. Although specifically built to produce

Only gummed tape is—

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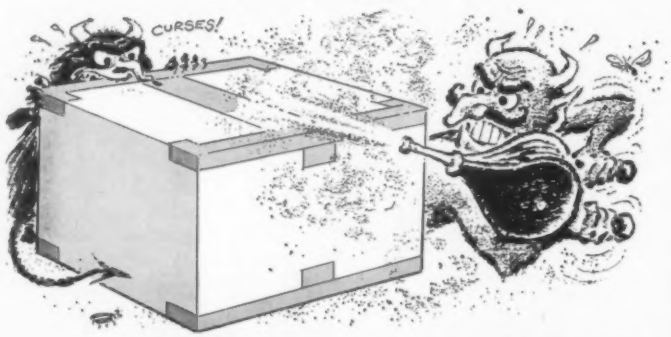

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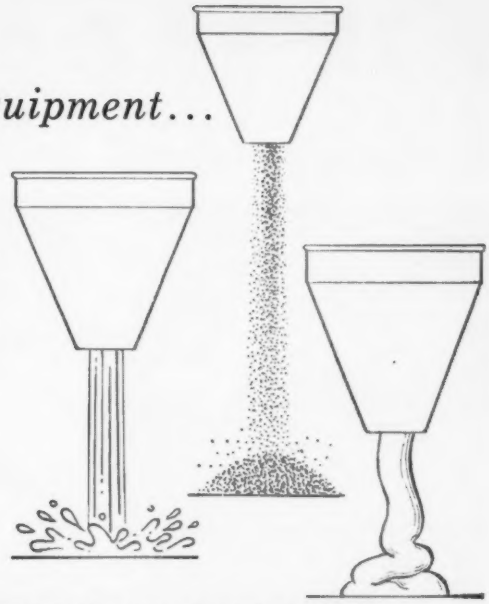

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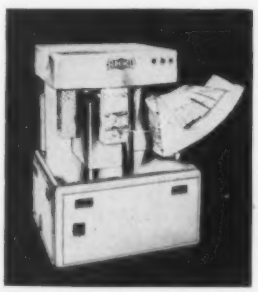
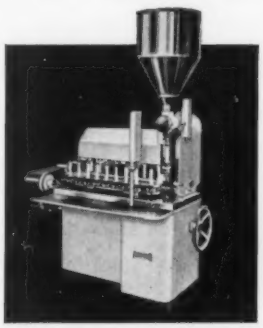
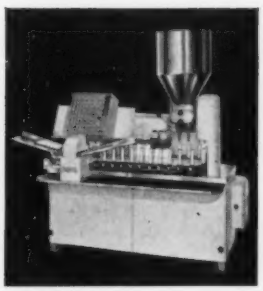


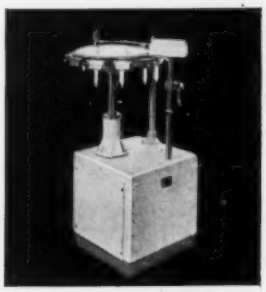
VUF automatically feeds and opens as many as 2100 bags an hour, can serve three combination weighers or portioning machines at one time. Synchronized controls maintain best filling speed, eliminating no-fills or double portioning of hard-to-handle materials. Opens each bag before filling. Handles sizes from 2½"-6¼" wide to 8¾"-15⅛" high. Quick changeover for biscuits, breakfastcerealsorgranularproducts.



GAB automatic tube filling and closing machine packages liquids, semi-liquids and stiff pastes at speeds as high as 3000 an hour. Complete filling, with no air bubbles or pockets. "No-tube, no-fill" efficiency. Takes tubes up to 1½" in dia., 7¼" in length, 1¾"x 8" on special order. Tube-cleaning, cap-tightening, blow-off and coding device standard equipment.



GAN, "big brother" of the GAB, fills and closes up to 7000 units an hour with one operator. Automatic tube feed, photo electric tube register and dual filling nozzles. Tube discharge can be tailored to virtually any cartonning set-up. Handles tube diameters up to 1½", lengths to 7¼". Like GAB, fast changeover from size to size, product to product.



GAP heat sealer works well in combination with the GAB ...enables you to seal perfectly packages of either polyethylene or p.v.c. plastic. Easy to hook up to the parent machine. And on the GAP, precision thermostats maintain proper sealing temperatures for whichever plastic material you work with, whether production is long-run or short.

ARENCO

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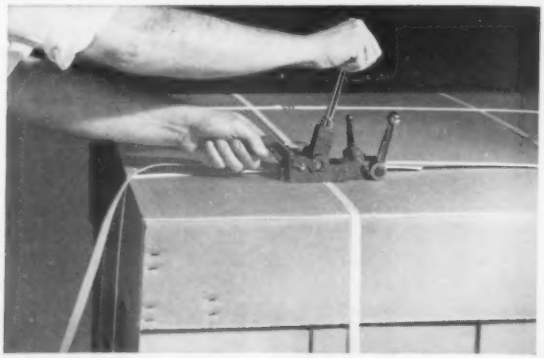
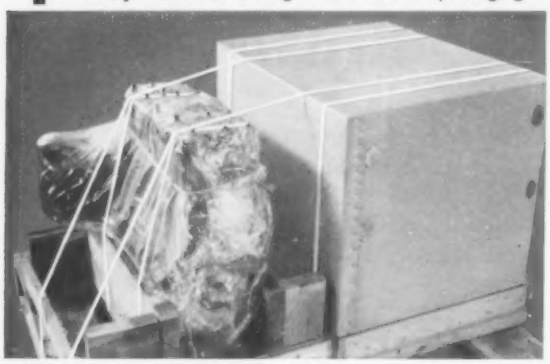
NEW SAFETY

1 **Radically new.** AVISTRAP cord strapping is made of super-strength Avisco® rayon . . . has no sharp edges, is flexible and easy to handle. Brings new safety—and new savings—to industrial packaging.



2 **Takes the danger out of tensioning.** If over-tensioned, AVISTRAP cord strapping will not break and lash out with jagged ends. Personnel work in complete safety, need no gloves. Safe handling also saves time.



3 **Safer for merchandise.** AVISTRAP holds heavy merchandise securely (4,000-lb. skid shown), will not chafe protective materials, has no tendency to snag handlers' hands. Light weight lowers shipping costs.

4 **More safety for your customers.** AVISTRAP-strapped packages aren't dangerous to open. AVISTRAP won't whip when it's cut. In addition, waste AVISTRAP is compact, easily burned or otherwise disposed of.

AVISTRAP* CORD STRAPPING

Super Strength • Economy • Reduced Damage • Easy Handling • Low Cost Imprinting

AVISTRAP*
CORD STRAPPING

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Now available in a range of sizes—along with complete tool and accessory service—from selected paper distributors in all major industrial areas.

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AMERICAN VISCOSE CORPORATION, INDUSTRIAL PACKAGING DEPT., 1617 PENNA. BLVD., PHILA. 3, PA.

shallow trays of corrugated board, the unit's basic design is adaptable to many types of paperboard and fibre containers, the manufacturer claims. Corrugated blanks fed into the machine actuate a vertically positioned air cylinder which forms the staple blanks into shape. Four pneumatically-driven stitching heads then simultaneously stitch the box corners. Each stitching head is a self-contained unit which cuts, forms, and drives staples directly from a spool of standard wire. The position of each stitching head is adjustable and boxes of various sizes and shapes may be stitched. For more information write: Saranac Machine Co., Dept. PE, Benton Harbor, Mich., or *circle number on card.*

24—Case Marker

The Rapid Case Marker is designed for putting up to 6 extra large numbers on wooden boxes,

paperboard cases, corrugated cartons, and fibre drums. The size of the number characters ranges from ⅛ in. up to 2 in. high. Standard capacity of the marker is 6 figure bands and approximately 50 different styles of type are available. The ink supply is from a felt pad contained within the unit. Various types of inks and colors are available, depending on the material being marked. By operating on a rocking-action principle, the 3-lb. unit makes a sharp impression with very little pressure from the operator, according to the maker. For more information write: Pryor Marking Products, Dept. PE, 434 S. Wabash Ave., Chicago 5, Ill., or *circle number on card.* *(End)*

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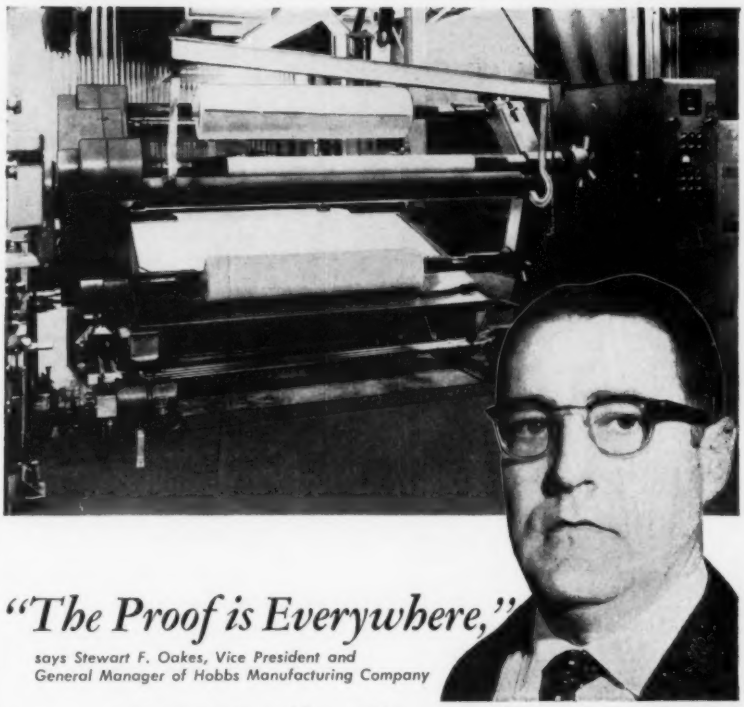

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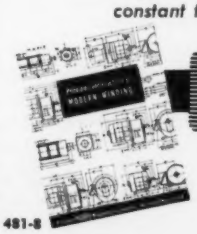
Whatever you wind or unwind, get more for your money with a Hobbs installation engineered to your special needs.

Get "Principles in Modern Winding", a new 20-page definition of constant tension winding.



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For your convenience, we have also included addresses of suppliers so that you may write directly for more information.

101—Steel Strapping Calculator

A slide-rule type calculator is available for computing cost of steel strapping required for one package to total required for entire run or year's total production. With instruction book, it also shows strengths and ft./lb. for all stock sizes of strapping. For more information write: Signode Steel Strapping Co., Dept. PE, 2600 N. Western Ave., Chicago 47, Ill., or *circle number on card.*

102—Glass/Plastic Containers

A 104-page catalog illustrates and describes a wide variety of stock containers and caps of glass and plastic. Ceramic decorating of bottles and jars by Glass Crafters also receives attention. For more information write: W. Braun International Co., Dept. PE, 500 W. Fulton St., Chicago 6, Ill., or *circle number on card.*

103—Automatic Pallet Loaders

Information is provided on the Series 300 automatic pallet loading machines. Units automatically place individual packages in a predetermined pattern on a pallet. For more information write: Alvey Conveyor Mfg. Co., Dept. PE, 9301 Olive Street Rd., St. Louis 24, Mo., or *circle number on card.*

104—Paper/Chipboard Partitions

A 4-page brochure pictures a variety of paper and chipboard partitions and die-cuts. Special designs are available for machine parts, electronic and automotive parts, pharmaceuticals, etc. For more information write: W. J. Bradford Paper Co., Dept. PE, 301 W. 16th St., Holland, Mich., or *circle number on card.*

105—Conveyor Chain

An illustrated brochure is being offered to show the features of a conveyor chain for automated packaging operations for foods and beverages. For more information write: Diamond Chain Co., Inc., Dept. PE, 402 Kentucky Ave., Indianapolis 7, Ind., or *circle number on card.*

106—Electronic Film Sealer

An illustrated data sheet gives specifications for an electronic sealer for flexible and rigid vinyl, acetate, saran, Kel-F, and coated papers. For more information write: Weldotron Corp., Dept. PE, 841 Freling-huysen Ave., Newark 12, N.J., or *circle number on card.*

107—Flame-Proof Barrier

Pyro-Kure, a barrier material with flame extinguishing properties, is described in a brochure. Nontoxic and noncorrosive to metals, it releases a gas that tends to smother flames. For more information write: American Sisalkraft Corp., Dept. PE, Attleboro, Mass., or *circle number on card.*

108—Handling Equipment

Bulletin ST-1 lists specifications for a variety of straight-line and rotary unscramblers, accumulating tables, lateral curve conveyors, and special-purpose conveyors. For more information write: Island Equipment Corp., Dept. PE, P. O. Box 38-276, Miami 38, Fla., or *circle number on card.*

109—Silicone Cushioning

A data sheet presents information on silicone rubber fibrous mats which, according to the maker, possess qualities superior to those of silicone sponge and foam. For more information write: Connecticut Hard Rubber Co., Dept. PE, 407 East St., New Haven 9, Conn., or *circle number on card.*

110—Packaging Knives

For use in packaging and other industrial application, a line of knives is discussed in an illustrated folder. Shapes and composition of the knives are considered as well as special applications. For more information write: Coes Knife Co., Dept. PE, 62 Coes St., Worcester, Mass., or *circle number on card.*

111—Automatic Wrapper

A 12-page catalog is offered on the Campbell wrapper, an automatic machine handling all types of wrap materials, tube forming them around the product. Unit then crimps, cuts, heat- or glue-seals, folds, and delivers product. For more information write: Hudson-Sharp Machine Co., Dept. PE, 1201 Main St., Green Bay, Wis., or *circle number on card.*

112—Heat-Seal Wrappers

A data sheet is available on the Model SUS heat-seal wrapping machines. Equipment uses roll-fed cellophane, waxed paper, and other materials. For more information write: Scandia Packaging Machinery Co., Dept. PE, 500 Belleville Tpk., North Arlington, N.J., or *circle number on card.*

113—Neck-Seal Applicator

A catalog on Sealamatic machines for automatic application of pre-cut cellulose neck bands and other types of closure equipment is available. For more information write: Gisholt Machine Co., Dept. PE, Madison 10, Wis., or *circle number on card.*

114—Corrosion Inhibitor Paper

A brochure is offered on Ferro-Pak, a paper designed to prevent rust by means of a volatile invisible gas which emanates from the material. For more information write: Crowell Paper Co., Dept. PE, 180 N. Wabash Ave., Chicago 1, Ill., or *circle number on card.*

115—Packaging Adhesives

A booklet outlines a variety of adhesives. Descriptions of applications include top and bottom case sealing, tight wrapping, multiple unit packaging, folding cartons, glass and can labeling, laminating, etc. For more information write: Swift & Co., Dept. PE, Adhesive

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"Buy Me" say attractive printed see-through bags of foods and confections.

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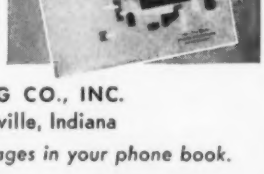
Personalized packaging service and quality controlled production based on more than 50 years' experience are your assurance that your packaging problems are in capable hands at Kennedy. Printed packages help sell your product at point-of-purchase. Kennedy's printing and design facilities add little to packaging cost—add much to product demand.

Write or call today for a Kennedy Sales Engineer to help improve your packaging—for greater sales.

Kennedy

Ask for a copy of "This is Kennedy"—an illustrated trip through Kennedy's versatile plant.



KENNEDY CAR LINER AND BAG CO., INC.
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Offices in most principal cities. See the yellow pages in your phone book.

Products Dept., Union Stock Yards, Chicago 9, Ill., or *circle number on card.*

116—Drum/Carton Liners

A 16-page illustrated bulletin offers information on the uses, types, and handling of plastic drum and carton liners. Included are charts indicating where liners may be used, what sizes to use, and various films adaptable as liners. For more information write: Protective Lining Corp., Dept. PE, 22 Woodhull St., Brooklyn 31, N.Y., or *circle number on card.*

117—Rotary Piston Fillers

Bulletin No. 911 describes line of rotary piston fillers available in 4 models. Units are designed for packaging viscous or semi-solid products within a speed range of 60 to 600 containers/min. For more information write: The Pfaudler Co., Div. Pfaudler-Permutit, Inc., Dept. PE, 1000 West Ave., Rochester 3, N.Y., or *circle number on card.*

118—Electric Temperature Controls

A 4-page brochure describes and gives specifications for several differential expansion Thermoswitch controls. Standard size, midget, miniature, and snap-on switches are included. For more information write: Fenwal, Inc., Dept. PE, 113 Pleasant St., Ashland, Mass., or *circle number on card.*

119—Polyethylene Films

Offered is a 14-page booklet describing various types of polyfilm polyethylene. Construction, sizes surface treatments, heat-seal types, colors, etc. are noted. For more information write: The Dow Chemical Co., Plastic Sales, Dept. PE, Midland, Mich., or *circle number on card.*

120—Vertical Case Sealer

A data sheet reports on features and specifications of a vertical case sealer. Sealed cases are delivered near the ceiling to permit overhead conveying to shipping or storage areas. For more information write: Midnight Engineering Co., Dept. PE, 703 S. LaSalle St., Chicago, Ill., or *circle number on card.*

121—Reinforced Gummed Tape

Advantages and uses of Comet Snake tape, a Fortisan-reinforced gummed tape for carton sealing, are pointed out and illustrated in a 4-page pamphlet. For more information write: Ludlow Papers, Inc., Dept. PE, Needham Heights, Mass., or *circle number on card.*

(Next page)

122—Imprinting Machine

The Markocoder, a portable imprinting machine, is presented in a bulletin. The automatic equipment marks or codes up to 600 units/min. For more information write: Adolph Gottscho, Inc., Dept. PE, Evans Terminal, Hillside 5, N.J., or *circle number on card.*

123—Net Weighers

A 6-page brochure is available on the Elec-Tri-Pak net weigher for filling dry products. Models range from single-scale, semi-automatic machines to multiple-scale net weighers. For more information write: Triangle Package Machinery Co., Dept. PE, 6631 W. Diversey Ave., Chicago 35, Ill., or *circle number on card.*

124—Blister Packagers

Illustrating 3 models of blister packaging machinery, a 4-page pamphlet also includes specifications. Machines for small volume and an automated model are described. For more information write: Tronomatic Machine Mfg. Co., Dept. PE, 25 Bruckner Blvd., New York 54, N.Y., or *circle number on card.*

125—Polystyrene Film

A folder is available on oriented polystyrene film, including a sample of the material. Characteristics listed for Polyflex include machineability, dimensional stability, and economy in comparison with other films. For more information write: Plax Corp., Dept. PE, P.O. Box 1019, Hartford, Conn., or *circle number on card.*

126—Electronic Counters/Controls

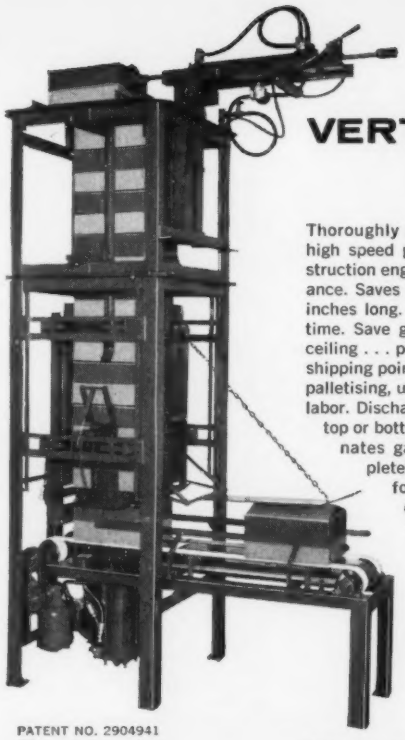
Bulletin B describes a line of electronic counters, controls, photo heads, and accessories. Illustrations are included. For more information write: Post Machinery Co., Dept. PE, 140 Elliott St., Beverly, Mass., or *circle number on card.*

127—Cushioning Material

An 8-page brochure (Form 650) shows typical applications and gives data on Tufflex cellulose fibre cushioning and fabric. For more information write: Wood Conversion Co., Dept. PE, 1st National Bank Bldg., St. Paul 4, Minn., or *circle number on card.*

128—Closing Methods

A condensed report on a time and motion study is available. Study compares relative efficiency of 4 different methods of closing corrugated containers: reinforced tape, gummed tape, hand stapling, and



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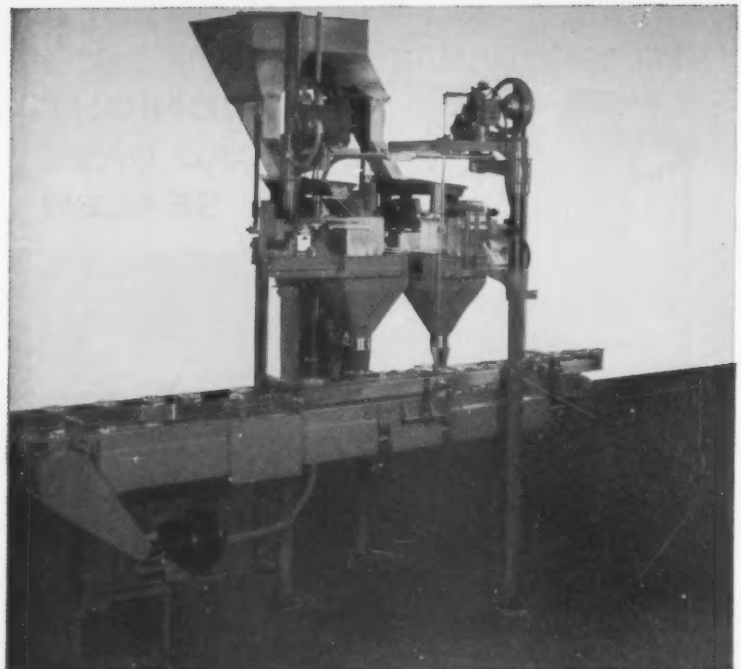

Up to 60 Containers per Minute
Filled and Weighed on this Dual-Line
SCOTT Net Weighing Unit

The famous Scott net weigher—fastest and most accurate net weigher made—serves double duty in this fully automatic fill-and-weigh system for mixed salted nuts. Empty cans are delivered from an unscrambler and carried to twin weighers on two lines by a dual-line conveyor.

After they are filled and weighed, the containers converge to a single line and proceed to a vacuum capping machine.

Various scales and power feeders can be provided to suit the requirements of a wide range of products, including hard candies, rice, beans, seeds, salt, tacks, etc. Also, any rigid container of glass, plastic or paper may be used.

Features include automatic controls for stopping and releasing containers at filling positions; for vibration to settle the product, and for converging into a single line. There is also a provision for "No can—no fill".

For complete details on what the dual-line Scott weigher can do for your packaging operation, send us complete details on the types of products and containers you run, and the weight range and speed you require.

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gluing. For more information write: Atlantic Gummed Paper Corp., Dept. PE, 1 Main St., Brooklyn 1, N.Y., or *circle number on card.*

129—Collapsible Tube Reference

Available is a reference booklet for selecting and specifying collapsible tubes, plastic closures, and custom-molded tips and caps. For more information write: Wheeling Stamping Co., Dept. PE, Wheeling, W. Va., or *circle number on card.*

130—Impact Recorders

A 4-page bulletin describes various models of impact, acceleration, and gravity recorders. Machines record shock, impact, and vibrations from any direction. For more information write: Impact-O-Graph Corp., Dept. PE, 1900 Euclid Ave., Cleveland 15, Ohio, or *circle number on card.*

131—Case Stapler

A 4-page brochure explains details of the Dual Stapler. Unit simultaneously staples tops and bottoms of a variety of filled shipping cases. For more information write: International Staple & Machine Co., Dept. PE, P.O. Box 270, Herrin, Ill., or *circle number on card.*

132—Aerosol Filling Machines

Data sheets are available on two aerosol filling machines. Model 12 GS is fully automatic and Model 8 GS is semi-automatic. For more information write: John R. Nalbach Engineering Co., Dept. PE, 6139 Ogden Ave., Chicago 50, Ill., or *circle number on card.*

133—Gummed Labels

A book of 164 pages illustrates a variety of designs for labels, stickers, and seals. It also describes the company's line of gummed label paper and how best to print it. For more information write: Mid-States Gummed Paper Co., Dept. PE, 6850 S. Harlem Ave., Bedford Park (Argo P. O.), Ill. or *circle number on card.*

134—Polyvinyl Tubes

A folder is offered on clear polyvinyl squeeze tubes. Available in sizes from ¼ to 10 oz., tubes may be used for a wide variety of products. For more information write: Thatcher Glass Mfg. Co., Inc., Plastic Container Div., Dept. PE, P.O. Box 363, Nashua, N. H., or *circle number on card.*

135—Box Stapling Machine

A data sheet has been prepared on a box bottomer. Unit staples entire box bottom in one operation with

copper-finished staples. For more information write: Bostitch, Inc., Dept. PE, 868 Briggs Dr., East Greenwich, R. I., or *circle number on card.*

136—Testing Equipment

A folder contains bulletins on each of the package testing machines and equipment produced by this company. Among others, impact, stress, strain, compression, and crush testing machines are included. For more information write: Testing Machines, Inc., Dept. PE, 72 Jericho Tpk., Mineola, N.Y., or *circle number on card.*

137—Polyvinyl Adhesives

A 4-page brochure has been released on the Seban line of polyvinyl resin adhesives and lists uses and some of the gluing machines on which it may be used. For more information write: PE, 16123 Armour St. N.E., Alliance, Industries, Adhesives Div., Dept. PE, 16123 Armour St., N.E., Alliance, Ohio, or *circle number on card.*

138—Facts About Pliofilm

An illustrated brochure gives a non-technical description of Pliofilm. "Facts You Should Know About Pliofilm" discusses methods of ordering, handling, printing, etc. For more information write: Goodyear Tire & Rubber Co., Dept. PE, Packaging Films Dept., Akron 16, Ohio, or *circle number on card.*

139—Package Sterilization

A 12-page booklet outlines a program on package sterilization. Methods covered are steam, dry heat, and gas sterilization and recommendations on which method to use are given for a number of products. For more information write: Wilmot Castle Co., Div. The Ritter Co., Dept. PE, 400 West Ave., Rochester, N.Y., or *circle number on card.*

140—Gummed Tape Chart

The Econo-Chart is a visual aid for determining the type and amount of gummed tape required for sealing different sizes and kinds of containers. The wall chart includes measurements for fibre drums, piecegoods wraps, folding boxes, flap and telescope cartons, and regular slotted cartons. For more information write: Hudson Pulp & Paper Corp., Dept. PE, 477 Madison Ave., New York 22, N.Y., or *circle number on card.*

141—Kraft Boxboards

A sample swatch demonstrates the Krafibre line of kraft boxboards. Included is a tabulation of various boxboards which enumerates types,

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STICKY

PATAPAR RELEASING PARCHMENT
WILL PROVIDE THE "LET-GO" YOU NEED

Here, the packager has to worry about a substance whose moisture and sugar content results in extremely adhesive qualities . . . but the product must never stick to its container. Patapar Releasing Parchment provides the needed combination of resistance to moisture and sugar penetration, and low adhesion factor.

Other Patapar Releasing Parchments provide quick release for foodstuffs such as frozen meats, where ice makes separation difficult . . . plastics, where extreme temperatures and inherent tackiness make it necessary to include the releasing parchment in the production process . . . and adhesive materials, where the product can stick to itself or its user.

Send for free samples of Patapar Releasing Parchments and informative brochure describing the whole Paterson line of Releasing Parchments.

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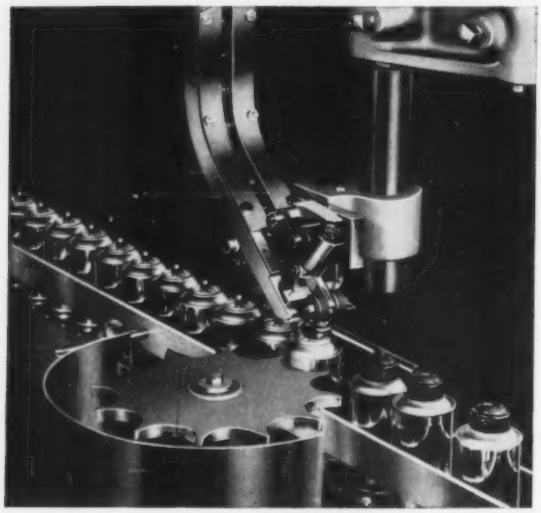

Closeup view of new Sorter Chute and Chute Escapement on H-O-F Capper. It rolls snap-on caps (up to 300 a minute) with perfect fit.

Now you can average up to 300 perfectly snug metal or plastic closures a minute with the Consolidated H-O-F Capper. That means extra profits—quickly!

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uses, and characteristics. For more information write: Columbia Box Board Mills, Inc., Dept. PE, Chatham, N.Y., or *circle number on card.*

142—Band Heat Sealer

An illustrated brochure describes 3 models of the Rotor-Sealer. Used in heat sealing thermoplastic materials, the band-type sealer features forced water cooling. For more information write: Ralph Chaffee & Co., Dept. PE, 2358-60 Market St., San Francisco 14, Calif., or *circle number on card.*

143—Packaging Adhesives

"How To Buy Adhesives For Better Adhesion" offers 23 yardsticks for selecting the right adhesives for a particular application. For more information write: The Arabol Mfg. Co., Dept. PE, 56 Nostrand Ave., Brooklyn, N.Y., or *circle number on card.*

144—Film Sealer/Coder

A continuous band sealer with code dater for sealing bags of polyethylene, Pliofilm, saran, cellophane, and laminated materials is described in a 4-page brochure. For more information write: Doughboy Industries, Inc., Dept. PE, 215 N. Main St., New Richmond, Wis., or *circle number on card.*

145—Protective Packaging

A sample of Sus-Rap is included in a 4-page illustrated pamphlet. Material is a pre-formed fibreboard wrap-around packaging material. Applications are also pictured. For more information write: Vanant Co., Inc., Dept. PE, 955 S. Water St., Milwaukee 4, Wis., or *circle number on card.*

146—Bag Closer

A bulletin is available which gives the details on a portable bag-closing machine. The unit will stitch either textile or paper bags. For more information write: Dave Fischbein Co., Dept. PE, 2730—30th Ave., S., Minneapolis, Minn., or *circle number on card.*

147—Polyethylene Film

A 16-page illustrated booklet describes the various types and uses of Visqueen polyethylene film. The booklet is titled, "Versatile Visqueen Film." For more information write: Visking Co., Div. Union Carbide Corp., Dept. PE, 6733 W. 65th St., Chicago, Ill., or *circle number on card.*

148—Case Sealer

An automatic case sealer which seals and discharges containers of

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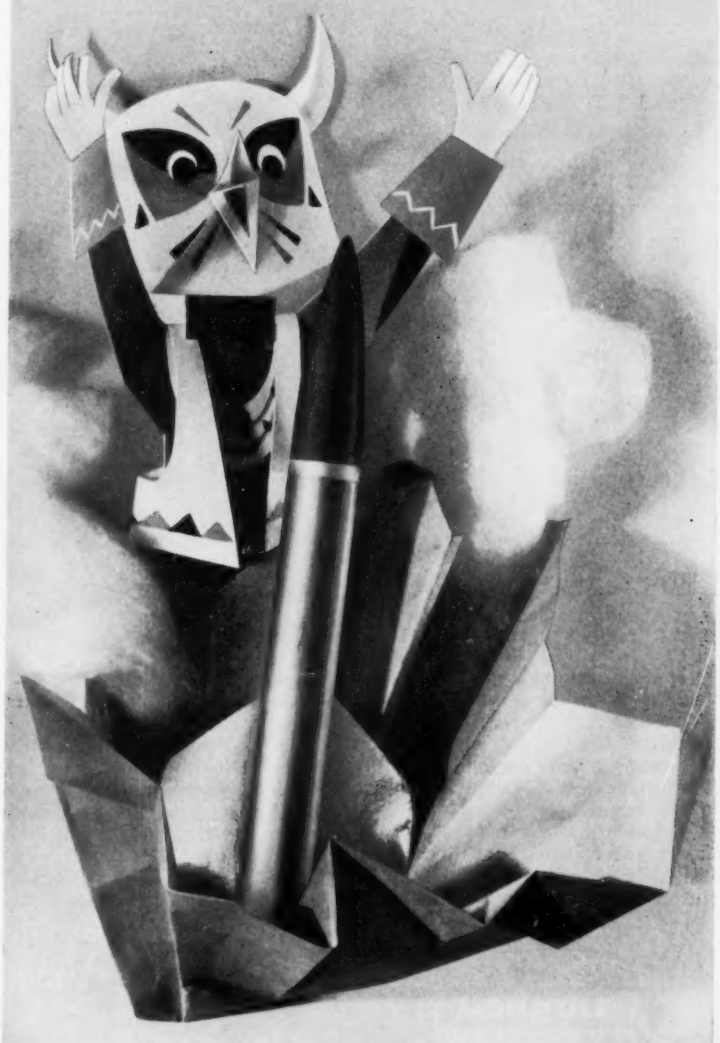

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various sizes, even when fed in random order, is described in a brochure. The Omnimatic-Rotopress automatically adjusts to varying carton sizes. For more information write: J. L. Ferguson Co., Dept. PE, Box 1226, Joliet 1, Ill., or *circle number on card.*

149—Plastic Bottles

A brochure, "Plastic Bottles Come of Age," analyzes the relative advantages of high-density polyethylene and polypropylene plastic bottles compared with glass and metal containers. For more information write: Hercules Powder Co., Dept. PE, 9th & Market Sts., Wilmington 99, Del., or *circle number on card.*

150—Corrugated Box Maker

The Rite-Size box machine is described in a brochure. Machine produces a wide variety of styles and sizes of shipping containers from corrugated sheet and also makes pads and liners. For more information write: Colt Packaging Machinery Co., Dept. PE, 53 Washington Ave., Cranston 7, R.I., or *circle number on card.*

151—Collapsible Metal Tubes

A 16-page booklet presents a line of collapsible metal tubes. It explains the metals, coatings, and finishes used and enumerates tube sizes, openings, caps, and applicator pipes available. For more information write: Standard Collapsible Tube Co., Dept. PE, Connecticut Ave., Box 271, Rochester, Pa., or *circle number on card.*

152—Air Cleaner

In Bulletin 144, an 18-head rotary inverted air cleaner is described and specifications given. Machine is designed to clean restricted-opening containers at speeds up to 300 units/min. For more information write: Pneumatic Scale Corp., Ltd., Dept. PE, 77 Newport Ave., Quincy 71, Mass., or *circle number on card.*

153—Stencil Inks

A descriptive folder, color card, and other information is available on a line of inks for stenciling, color coding, inspection, and other marking. For more information write: Reynolds Ink, Inc., Dept. PE, 4536 Euclid Ave., Cleveland 3, Ohio, or *circle number on card.*

154—Coating/Laminating Films

A technical reference has been prepared on Du Pont substrate films for extrusion coating and laminating. Some types described are polyethylene, cellophane, and Mylar polyester. For more information write: E. I. du Pont de Nemours &

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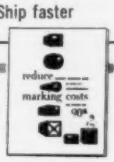

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We recently were appointed American agents for Packaging Abstracts, published by the British research association PATRA—The Printing, Packaging & Allied Trades Research Association. This service gives you in a single, handy periodical (5½ x 8½-in., averaging 75 pages a month, plus the annual index), brief summaries of packaging articles that have appeared in some 200 packaging magazines plus over 150 magazines devoted to printing and allied subjects, and numerous patents, books, pamphlets, and technical data provided by makers of machinery and materials. An average issue carries about 400 abstracts based on literature received from all parts of the world.

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Co.(Inc.), Dept. PE, Film Dept., Wilmington 98, Del., or *circle number on card.*

155—Winding Principles

A new edition of the handbook, "Principles and Practices of Modern Winding," has been published. Center shaft winding of plastics, paper, etc. is discussed and winding machines and accessories are described. For more information write: Hobbs Mfg. Co., Dept. PE, 38 Salisbury St., Worcester 5, Mass., or *circle number on card.*

156—Foil Carton Board

Offered is an illustrated booklet on aluminum foil carton board. In addition to describing its properties and points to consider in specifying and printing the material, Anaconda's services are outlined. For more information write: Anaconda Aluminum Co., Dept. PE, P.O. Box 1654, Louisville 1, Ky., or *circle number on card.*

157—Latex Coating

Bulletin 340 provides technical and descriptive data on the new polyvinylidene chloride latex, Resyn 3600. With combination of barrier and application properties, material may be used as a protective coating for packaging materials. For more information write: National Starch & Chemical Corp., Resin Div., Dept. PE, Grand Central P. O. Box 50, New York 17, N.Y., or *circle number on card.*

158—Ticketer/Labeler

Operational procedures and specifications of the Amscomatic 300, a machine which automatically affixes labels or tickets to sealed polyethylene packages, are described in a catalog sheet. For more information write: Amsco Packaging Machinery, Inc., Dept. PE, 31-31 48th Ave., Long Island City 1, N.Y., or *circle number on card.*

159—Inks For Plastic Films

Technical Bulletin 609 provides data and samples of polypropylene and polyethylene film which have been printed with Magnagloss flexographic inks. For more information write: Claremont Pigment Dispersion Corp., Dept. PE, Powerhouse Rd., Roslyn Heights, L. I., N.Y., or *circle number on card.*

160—Meat Packing Scale

Model 4133 Shadograph scale is a high-speed unit designed for production weighing and packaging of sliced bacon, luncheon meats, cheese, and similar products. Bulletin 3294 provides specifications on the scale. For more information write: The Exact Weight Scale Co., Dept. PE, 912 W. 5th Ave., Columbus 8, Ohio, or *circle number on card.*

161—Skin Packaging

"Skin Packaging For Industry" is a general discussion of the technique of thermoforming a transparent plastic film over a product to an uncoated printed board in one machine operation. For more information write: Textile-Kraft Products Co., Dept. PE, 126 N. Jefferson St., Milwaukee 2, Wis., or *circle number on card.*

162—Auger Filler

An illustrated specification sheet describes a new automatic auger-filling machine. Unit will fill dry products in almost any rigid container, including tapered jars, oval cans, or tall, narrow containers. For more information write: FMC Packaging Machinery Div., Food Machinery & Chemical Corp., Stokes & Smith Plant, Dept. PE, 4994 Summerdale Ave., Philadelphia 24, Pa., or *circle number on card.*

163—Corrugated Paperboard

A reprint of an article describes a super-strength corrugated board which has been coated or impregnated with a new material. Known

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Chicago 1, Illinois

as K-1 Board, it has applications for heavy-duty corrugated boxes, tote boxes, etc. For more information write: Tri-Wall Containers, Inc., Dept. PE, 799 Washington St., New York 14, N.Y., or *circle number on card.*

164—Milk Inspectors/Loaders

A 4-page folder describes and illustrates machines that automatically inspect milk cartons, arrange them in case loads, and place them into cases. For more information write: Thiele Packaging Machinery Co., Dept. PE, 1000 Berry Ave., St. Paul 14, Minn., or *circle number on card.*

165—Packaging Services

An 8-page brochure has been published to describe the Los Angeles packaging, manufacturing, and distributing facilities of this company which are available for pharmaceutical, cosmetic, etc. firms selling to the Western market. For more information write: Packaging Corp. of America, Dept. PE, Rittman, Ohio, or *circle number on card.*

166—Plastic Additives

The principle types of Proxmelt Concentrates (polyethylene, butyl rubber, and polyisobutylene) are discussed in a brochure. Materials serve as additives for wax, oil, grease, micro and paraffin blends, and act as fortifying agents for laminating and heat-sealing additives. For more information write: Pyroxylin Products, Inc., Dept. PE, 4851 S. St. Louis Ave., Chicago 32, Ill., or *circle number on card.*

167—Bakery Packaging

A folder is being offered on packaging cookies and crackers. Cellophane, in combination with cartons, fractional packs, bags, and tray overwraps, are illustrated. For more information write: Olin Mathieson Chemical Corp., Packaging Div., Dept. PE, 460 Park Ave., New York 22, N.Y., or *circle number on card.*

168—Tests For Corrugated

A 4-page brochure describes a variety of tests used to determine effectiveness of package protection before the corrugated container is shipped. For more information write: Gaylord Container Div., Crown Zellerbach Corp., Dept. PE, 111 N. 4th St., St. Louis 2, Mo., or *circle number on card.*

169—Checkweigher

Available is an illustrated brochure describing an automatic checkweigher, Model 9460, which may be used for bags, cartons, and packages from 50 to 200 lb. Packages are checked while in motion by a light station which gives visual indication of each package as being over, under, etc. For more information write: Toledo Scale, Div. of Toledo Scale Corp., Dept. PE, Toledo 12, Ohio, or *circle number on card.*

170—Paper Sizer

Mersize, a fortified rosin size for use in the papermaking industry, is described in a booklet. Material is supplied either as a ready-to-use size or as a fortifying addition for rosin sizes. For more information write: Monsanto Chemical Co., Organic Chemicals Div., Dept. PE, 800 N. Lindbergh Blvd., St. Louis 66, Mo., or *circle number on card.*

171—Gluing Machines

A 4-page folder is offered on the forced-feed SK-429K Glu-Line system. Equipment may be installed on most Standard-Knapp top and bottom gluers. For more information write: Emhart Mfg. Co., Portland Div., Dept. PE, 127 Main St., Portland, Conn., or *circle number on card.*

172—Miniature Electric Eyes

Bulletin 590 describes typical installations of miniature electric eyes

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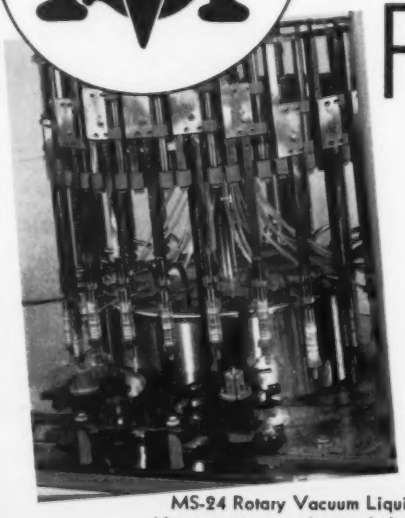

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Div. of Geo. J. Meyer Manufacturing Co., Worcester 3, Mass.

for inspecting, sorting, counting, web control, registration, level control, and other phases of packaging. For more information write: Photomation, Inc., Dept. PE, 96 S. Washington Ave., Bergenfield, N.J., or *circle number on card.*

173—Multiwall Bags

The 16-page "Multiwall Packaging Guide" contains information on types of multiwall bags, closures, proper storage and handling, loading systems, and multiwall packaging equipment. For more information write: Bemis Bro. Bag Co., Dept. PE, 408 Pine St., St. Louis 2, Mo., or *circle number on card.*

174—Polyethylene Coating Resin

A technical data sheet has been prepared on Petrothene 205-15. This polyethylene extrusion-coating resin may be used on cellophane and foil, as well as porous substrates. For more information write: U.S. Industrial Chemicals Co., Dept. PE, 99 Park Ave., New York 16, N.Y., or *circle number on card.*

175—Shock Overload Indicator

Being offered is descriptive material on the P/N TA 275 shock-overload indicator. Standard settings range from 5 to 50 G's. For more information write: Earl S. Condon Co., Dept. PE, 3450 Wilshire Blvd., Los Angeles 5, Calif., or *circle number on card.*

176—Plastic Bag Maker

Bulletin 270 describes in-line manufacturing, from resin to printed plastic bags, with the Bag-Line integrated system of production equipment. For more information write: F. J. Stokes Corp., Dept. PE, 5500 Tabor Rd., Philadelphia 20, Pa., or *circle number on card.*

177—Aerosols

A 28-page booklet, "The Magic of Aerosols," traces aerosol history and growth, markets and products, containers available, and industry services. For more information write: Continental Can Co., Dept. PE, 100 E. 42nd St., New York 17, N.Y., or *circle number on card.*

178—Drum Dumper

The Drum King is a hydraulic dumping device which grasps a drum in a vertical or horizontal position, lifts it to the required height, and rotates the drum forward 180 degrees with a control for starting, stopping, and reversing the rotation for pouring of liquids. For more information write: Uhrden Inc., Dept. PE., Dennison, Ohio, or *circle number on card.*

179—Urethane Coatings

A series of 12 clear urethan coatings are described in an information file. Coatings are recommended for finishes or protective coatings in place of varnishes or lacquers. For more information write: BB Chemical Co., Dept. PE, 784 Memorial Dr., Cambridge, Mass., or *circle number on card.*

180—Hole Punch

Circular F-372 describes two models of solenoid-operated hole punches for bags. Model 55HF hole punch is designed for installation on Haysen wrapping machines and Model 55KF punch mechanism is provided with a frame for table or floor mounting. For more information write: Ketchpel Engineering Co., Dept. PE, 1401 Palisade Ave., West Englewood, N.J., or *circle number on card.*

181—Molded Corrugated

An information sheet is offered on Spring-Pak protective packaging. Material is a continuous sheet of molded corrugated available in a variety of forms for special applications. For more information write: Pillo-Pak of New England, Inc., Dept. PE, Pine St. Extension, Nashua, N.H., or *circle number on card.*

(End)

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What we think

AMA and PI should avoid overlapping meeting dates

We do not like to see two of the most effective organizations in packaging schedule their programs during the same week, which is the situation this month. We once suggested there ought to be some sort of clearing house for packaging organization meeting dates. Probably the reason nobody has done anything about it is simply that no one individual or organization feels like taking the first step.

Our own privilege is to enjoy cordial relationships with the full-time staff officers as well as the industry representatives active in both these groups. Aside from absorbing the contributions their meetings make to the technical and operational packaging field, we really look forward to having lunch once in awhile with such grand fellows as Charlie Feld, executive director of Packaging Institute, or John Wood, packaging coordinator of American Management Association. We have often wanted to get them, plus their staff associates and the elective or industry officers of their groups, into a corner and settle once and for all this question of overlapping meeting dates.

The big timber country of Northern Wisconsin, where we spent most of our summers while growing up, abounds with tales of the lumberjacks. Tradition has it that on payday, these joyous artisans of the forest would climb aboard a North Western train and begin taking their oral dosages of antifreeze as the train leisurely puffed its way through the Oconto River valley headed for Green Bay. But the latent volatility of the passengers soon exploded and controversies of heroic proportions began erupting.

The intrepid conductor simply cut the car out of the train at Suring and set it out on a siding, picking it up on his next trip. We understand this breathing spell gave his passengers ample time to reconcile their differing opinions, patch up their cracked heads and settle down for the ride to Green Bay.

The lumberjacks have now passed into legend and the trains are all but gone from those woods and lakes. If we still had them, it would be a temptation to load the paid and elected officers of AMA and PI into one of those old coaches, and then set it out on some lonely siding amidst the pines to thrash out this question of meeting dates. But, seriously, and without benefit of isolation, something has got to be done.

Packaging people are getting more choosy as to which meetings they attend. More and more, they are asking such questions as these: How can we evaluate a meeting in advance? How can we predict its usefulness to us in our jobs? Will we hear qualified speakers talk about things concerning us? Will we have a chance to talk to them? Will we meet our opposite numbers from other companies? What will we get out of it? What can we give it?

The unique value of "people-to-people" contact

There is a growing sense of picking and choosing meetings more carefully. People are realizing that the big thing you get out of a meeting is not always what you hear or say as much as it is the fact of *participation* itself. The face-to-face contact with people in your line of work is something no other form of education or communication gives you. Here and here alone is the justification for any meeting.

As the sponsors and planners of meetings rise to their responsibilities and offer us better programs, it is inexcusable for two fine groups to hold meetings of interest to packaging people at the same time, or even during the same week. We are not asking either group to defer to the other, and we don't want any discussion of who set which date first. The obligations of each group to its joint clientele are too important to permit petty bickering or an unproductive sense of competition for crowds to seep into either one.

But it does seem reasonable to ask each group to use a little more judgment when setting a date, making a real effort to find out if any other organization has something in the works. Why not start doing this now? Both groups have so much to offer our field that the least each can do is to put on its programs with as little conflict as possible.

Bruce Hoffman

Editor

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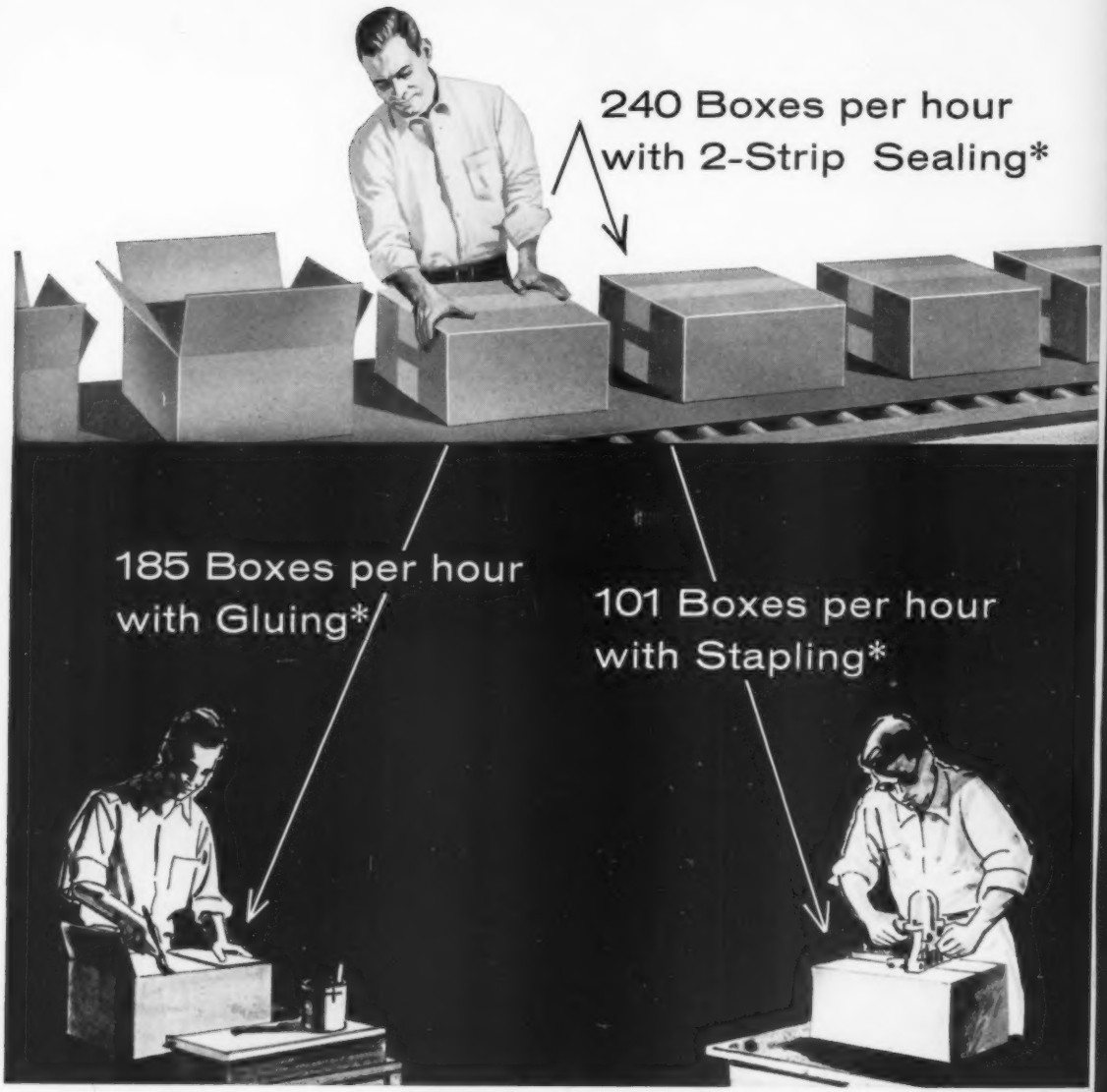

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